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The Comparative Merits of Air and Electric Drills.

BY GRANVILLE E. PALMER.*

Invention has probably never won fewer and poorer rewards, in proportion to the talent expended, than those received by the designers of electric drills; and as the progress of the art during the last 20 years is analyzed, it seems to me that the difficulties presented to the designers of this form of apparatus are insurmountable.

The air drill seems to occupy a very secure position with regard to its retention as a standard form of apparatus; and it is quite remarkable that, as a labor-saving device, one of the most inefficient pieces of apparatus ever designed should have proved the most economical in its particular field.

Drilling holes in rock is an operation in which an exhibition of bull strength and awkwardness is desirable, and this feature the air drill seems to possess to a commercially marketable degree, to the exclusion of all other types of power drills. A jarring hammer blow, transmitted to a cutting edge is the way of all ways for putting in rock holes of moderate depth; and for this class of work, tools driven directly by air or steam are practically ideal, as all of the parts of the reciprocating piston that are liable to damage are easily protected from mechanical injury, and are so inclosed in a chamber of elastic and compressible gas, that no damage results to them, even when the drill is instantly stopped by sticking in the hole, a not infrequent occurrence. Of course the electric drill, with the short, rapid stroke, cuts a cleaner and straighter hole than the air drill; but it does stick and stop short, with damaging results.

The particular advantages claimed for the electric drill over the air drill are low first cost of plant, ease of installation, and great economy of power. Every one of these claims is true; but when the high cost of maintenance and time lost incident to breakdowns are considered, the above claims sink into insignificance, particularly when the continuous operation of the entire mine depends more upon the reliability of the rock-drilling apparatus than on perhaps any other factor.

The reasons that the air and steam drills are a success, as above noted, are that the essential delicate parts are protected from jar, and that no injury to the apparatus occurs when the drill is stopped by a "sticky hole." The reason why the electric drill has proved a failure is because it is impossible to protect properly the motor from jar, and at the same time properly transmit and transform its rotary motion to the reciprocatory stroke necessary to operate the drill steel.

No form of insulation has yet been devised that will stand up under the continued jar of the drill body for any appreciable length of time; and though the results of experimental work have led several designers to believe that they had found a satisfactory form of insulation, the most successful types of apparatus have the drill proper connected with its motor by a flexible or semi-flexible shaft.

With the motor removed from the drill body, the insulation difficulties are overcome, and the transmission of the power from the revolving armature to the reciprocating draw bar, and from it to the chuck and ratchet bar is the last point to consider. As the travel of the draw bar driven by a crank shaft and internal cam must have definite limits of motion, and as the connection between the draw and chuck bars must be sufficiently flexible to permit the draw bar's continued operation when the chuck bar is held stationary by reason of the drill sticking in the hole, and at the same time be sufficiently rigid to permit of the chuck bar striking a blow representing 100 or more foot-pounds of energy under normal conditions, an exceedingly efficient spring transmission is necessary. Though wonderful things have been accomplished in spring manufacture, it does not seem that the art has reached the stage where the above results can be obtained in regular practice.

The usual reason for the installation of power drills in place of hand steel, is to permit of a more rapid advance in this branch of the work, so that it may keep step with other operations, and the use of apparatus that does not accomplish this result, even though it does perform the operation of drilling holes with somewhat greater economy, is a step backward. I think that the following table, compiled from a recent comparative test between two Adams electric drills (which certainly are equal, if not superior to any other electric drills on the market) and two old 2¾-in. air drills, operating at 80 lb. pressure at sea level, shows conclusively that the value of electrical apparatus for work of this character is questionable.

	Air Drill.	Electric Drill.
Actual hours drilling	317	100
Actual feet drilled	1,279	253
Average feet per hour	4	2.55
Times stopped for repairs	0	17

The work was done on black diabase during 53 consecutive 10-hour shifts.

*136 Pearl street, Boston, Mass.

Mine Fires at Broken Hill.

The recent fire in the Broken Hill Proprietary mine, New South Wales, was the third time that mine has been on fire. The first fire occurred July 21, 1895, in the locality known as "MacGregor Open Cut," Block 11, near Drew shaft. There was little doubt at the time that it commenced in the timber exposed at the level in the bottom of the open cut, under which spot creeps had occurred, and the timber was all crushed and the area had collapsed. The area fortunately was confined by blocking up the various level ends, which prevented the fire spreading throughout the mine. It burnt for years and cost the company between £20,000 and £30,000 from first to last. The origin of the fire was unknown, but incendiarism was suspected.

The second fire broke out Sept. 12, 1897. This occurred among the old timbers near the No. 2 level, between Brodribb and Jamieson shafts, a considerable distance north from where the first fire occurred. The prompt and energetic action of the general manager resulted in the area being limited. This fire may be smoldering still, but it is in a locality which is worked out and is completely blocked up. A searching inquiry was made as to the cause of the outbreak, and there were strong reasons for suspecting incendiarism, but nothing was ever revealed.

The last fire broke out Feb. 17, 1906, in the 400-ft. level, about 150 ft. north of McBryde shaft, and about midway from Wigg shaft. It was caused through a blast and by the carelessness of the men who did not return after it was fired. The gallery was immediately blocked up by a wall of sandbags, which stopped the draft and prevented the fire from increasing rapidly, but eventually it was found necessary to flood the mine.

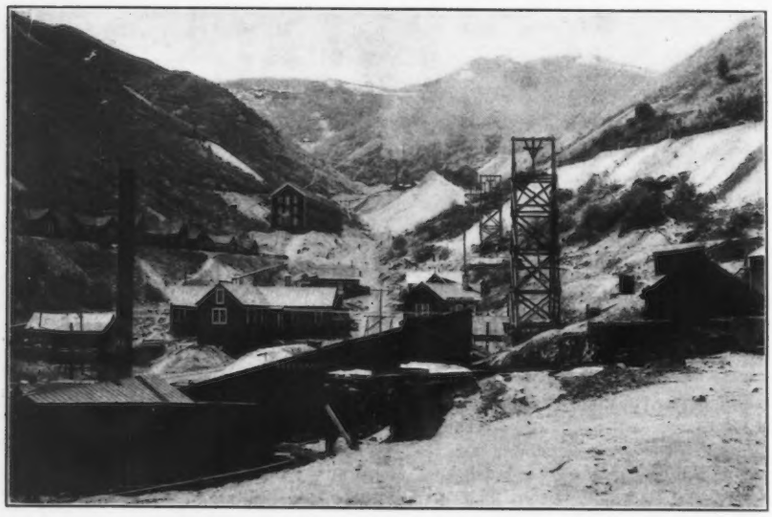
Bingham Canyon, Utah.

STAFF CORRESPONDENCE.

The first discovery of ore in Bingham, and the first mining location in Utah, was that of the old Jordan claim, located Sept. 17, 1863, which is now owned by the United States Mining Company. This discovery was made by G. B. Ogilvie, a Mormon apostle, but the district owes much to Gen. P. E. Connor, commanding the Third California Volunteer Infantry, which was stationed at Fort Douglas in 1862, and for several years later.

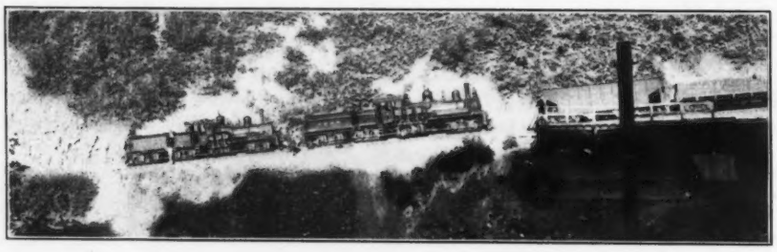
General Connor, having seen the effect of the gold rush of 1849 upon California, and the transformation that ensued, had an idea that the speedy solution of the Mormon question lay in the discovery of mines in this region. Accordingly, he gave long and frequent furloughs to his soldiers, who, having been recruited among the miners of California, were experienced prospectors. These miner-soldiers would go off on long prospecting trips, and it was due to their work that the camps of Bingham, Big and Little Cottonwood and Stockton, owe their discovery.[1]

Nor was General Connor wrong in his theory, although it was much longer in working out than he anticipated. Unfortunately the orebodies discovered by his soldiers were mostly of the base metals, requiring smelting (which at that time was a process not understood at all), and good facilities for transportation (which did not begin to be offered until 1869). The old name given to the mining district formed by the soldiers, soon after the discovery of lead ore by Ogilvie, was West Mountain; this name is still retained. The first mining was done upon the lead deposits, but later (in 1864) the placers were discovered and worked; however, these never amounted to much. In the early seventies the Winnamuck smelter was erected to treat the lead ores, and later small concentrating plants were put in. During the seventies Bingham became an important producer of lead ore, and several smelters were installed.



OLD JORDAN MINE.

Early in 1880, mining of the oxidized gold ores, which occur in the weathered portions of the future copper producers, was begun. Stamps and simple amalgamators were used; considerably later, cyaniding was tried; but these gold mining operations were not long lived, not being very profitable. It is interesting to remark that these gold miners, whenever they discovered sulphide ore, immediately caved the workings to cover it up, this ore being then considered a very unfavorable indication.



SHAY ENGINES ON ONE OF THE GRADES—COPPER BELT R. R., BINGHAM, UTAH.

In December, 1896, the Highland Boy mine shipped 5000 tons of copper ore and the public began to appreciate what the copper resources of Bingham might be. Since then the development of the copper ores has been rapid. Now it is the scene of prodigious undertakings, including the mining in the near future of 6000 tons daily of low-grade copper ore from one property alone. The large copper producers of the Bingham camp are the Highland Boy, Utah, Boston Consolidated, United States, Yampa and Bingham Consolidated. Of the more recent developments, the Ohio Copper Company, which mines about 200 tons of copper per day from its Columbia mine, and the Bingham-New Haven, are very promising, as is also the copper deposit being developed by the Utah-Apex company.

Lead mining, although subordinate in importance to copper mining, nevertheless is by no means dead. Considerable lead

LOOKING UP UPPER BINGHAM CANYON, ORE BINS OF UTAH COPPER COMPANY'S MINE IN FOREGROUND.

[1]Connor's regiment arrived in Utah in October, 1862, and established Camp Douglas. He and his men were certainly adepts in locating the mineral deposits of Utah, which previously had scarcely been looked at; but they accomplished little or nothing in the way of development, and it is open to question whether they did not do more harm than good. Later on, when more legitimate prospectors came into the country, they had much trouble because of the locations which Connor's men had freely plastered over it.—Ed.

ore is mined by the United States Mining Company from its Galena mine, by the Bingham Consolidated from its Lark vein, and also from the Lead Mine vein, while the newly revived Phoenix mine has yielded much lead ore in the last six months from the lower workings off the long tunnel run to catch the vein. Besides these, the Red Wing group, in Markham gulch, has developed a very good body of lead ore, and it is planned to erect a 200-ton concentrating plant to treat the lead ores from this group. Moreover, the New England Copper and Gold Mining Company is operating a small concentrating plant, treating about 50 tons of lead ore a day. This company also ships some first-class lead ore. The concentrating ore from the Phoenix is treated at the Wall custom mill, where about 40 tons of this ore is concentrated in the eight hours the mill is run.

Bingham camp is composed mainly of sedimentary rocks, much fractured and in many places intruded by porphyry dikes and sills. The sedimentaries are massive quartzites with thinner beds of limestone intercalated with them. These strata have a general east and west strike and dip from 20 to 50 deg. to the north. They are of Carboniferous age and are considered to be the equivalents of the strata forming the country rock at Park City. The known orebodies of the camp are distributed over a vertical range of 2565 feet.

The lead ores at present being worked range from 15 to 35 per cent. lead and from 5 to 15 oz. of silver, besides a little gold. The copper ores are of two general types, viz., the sulphide ores occurring in the limestone as replacement deposits, and the silicious ores. The replacement ores are characterized by a high excess of iron and carry from 2 to 18 per cent. copper, averaging about 3 to 3.5 per cent. as mined. They also carry from $1 to $4 per ton or even more, in gold and some silver. These ores are treated by smelting. The silicious ores are of two general types, viz., the low-grade porphyry ores averaging about 2 per cent. copper, and 0.03 oz. gold, which have to be concentrated, affording a mineral with a silica excess of 10 to 15 per cent.; and the ores of the fissure deposits in the quartzite, of which the Ohio Copper Company's Columbia mine is a typical example, these being brecciated quartzite, mineralized with chalcocite and bornite. This ore, which also is of the concentrating class, averages about 3 per cent. copper, but when concentrated has an iron excess of 8 to 15 per cent.

The ore deposits are of three general types, viz., the true fissure veins, the replacement deposits in the limestone, and the low-grade mineralized porphyries. The true fissure deposits are rare. Among them are the Galena fissure, the Phoenix, the Winnamuck and the veins in the Columbia mine of the Ohio Copper Company. All of these are lead deposits except the Columbia, which is a copper mine and is remarkable for the occurrence in it of seams of metallic copper and red oxide of copper in certain zones in the brecciated quartzite along the fissure. These fissures are in the quartzite and are rarely very large, as the quartzite has not been a kindly rock for mineralization.

The replacement deposits are mainly copper ores, but there are some replacements of lead ore in the limestone where the lead fissures have cut it. These mineralizing fissures have a general northeast-southwest direction. Wherever they have cut the different bands of limestone the ore-bearing solutions have had a chance to eat out into the lime and form large deposits of ore extending laterally from the fissure along the east and west striking limestone. Where these fissures are in the quartzite, there has been no mineralization, and the fissures are small affairs and practically barren. Some small displacement has occurred along many of these fissures, but it is rarely over 150 ft. In many places there are intrusions of porphyry near the orebodies, and it is thought that these had a part in the formation of the orebodies.

The porphyry ores are low-grade. They consist of brecciated monzonite porphyry, which has subsequently been mineralized, mostly with chalcocite and bornite. This porphyry belt is largest in the Utah Copper Company's property and in that of the Boston Consolidated; it extends northward into the Starless group, where it is not so large and is less developed. To Col. E. A. Wall belongs the credit of recognizing the value of these low-grade porphyries a long time before other people appreciated their possibilities.

While most of the mining is done by large companies such as the United States (which operates the Telegraph, Jordan and Galena mines), the Bingham Consolidated (which operates the Commercial mine, the Dalton & Lark, the Brooklyn and the Lead mine), the Yampa, the Boston Consolidated, the Utah Consolidated, and the Utah Copper Company, there is much mining being done on a smaller scale in the endeavor to develop similar large copper deposits, and also some ventures on the less important lead ores.

The Phoenix mine has lately made a good record in producing lead ore. This old deposit is being re-opened through a long tunnel. It is a fissure deposit in the quartzite and is thought to average about 10 ft. in thickness. The ore carries from 20 to 35 per cent. lead, a high excess of iron and from 8 to 15 oz. silver. This mine is north of the Yampa and near the Highland Boy. The Butler-Liberal is developing lead ore through a long tunnel. There is some copper ore also in this mine. The Red Wing group of the Utah Development Company has considerable good lead concentrating ore blocked out. It is opened up by a shaft sunk upon the inclination of the vein (about 25 deg. to the north). Levels have been run at intervals of 50 ft. and the orebody opened to a depth of 250 ft. The ore-shoot is a replacement in the limestone and has been opened for 500 ft. along the vein. This shoot averages 4 to 5 ft. in thickness, and the ore is said to run 10 to 25 per cent. lead, $1 gold, 7 to 8 oz. silver, and 1 to 2 per cent. copper. There are three other well defined shoots in the property. Plans are now in preparation for a 200-ton concentrating plant to be erected at the mouth of Markham gulch. The company estimates that it has two years of ore in sight.

Among the smaller copper producers is the Yampa, in Carr fork of Bingham cañon. This company has a smelter, which is equipped with six Edwards and two McDougall roasters, two blast furnaces, and two reverberatories. The company has about 165 men at the smelter and about 180 men at the mine. The orebody is a replacement in the limestone; the ore is similar to the Highland Boy ore. The company mines about 500 tons of ore a day. The Bingham-New Haven, another company in Carr fork, has a short Riblet tramway and is quietly developing a replacement deposit in the limestone. It also is near the Highland Boy. This company has already shipped some copper ore. The Bingham Central, near the Highland Boy, is running two long tunnels to develop its property.

The Utah Apex Mining Company is also developing a replacement deposit of copper near the Highland Boy and the Yampa. A 15-drill Norwalk compressor has just been bought. The company is driving a deep tunnel, at present 1200 ft. long, which will cut the vein 1000 ft. below the surface. There is a series of limestone replacement deposits in this property. The company is mining one and just beginning on a second. The first deposit has been opened 1000 ft. along its strike and is said to average 2 to 3 ft. along that length, although in places it is 8 to 10 ft. The ore is said to go from 2 to 7 per cent. copper, $2 to $16 gold, averaging $5, and 6 to 8 oz. silver. Fifty to sixty men are working on the property. The company intends to put in a tramway to take its ore from the main workings to the mouth of the deep tunnel.

In the main Bingham cañon are several of the large producers. At the head of the cañon are the mines of the United States company, viz., the Telegraph and the Jordan, and also its lead mine—the Galena. The Commercial mine of the Bingham Consolidated is also on a side gulch leading off from this cañon. Here a caving system of mining is used, the sublevel interval being 18 ft. It is a replacement deposit and is worked through two tunnels.

Near the Utah Copper Company, further down the gulch, is the Ohio Cop-

TERMINALS OF THE TWO TRAMWAYS, ALSO WINNAMUCK MILL, BINGHAM, UTAH.

LOOKING UP CARR FORK, SHOWING PART OF BINGHAM—SHAWMUT MILL IN FOREGROUND, BINGHAM, UTAH.

per Company, which is mining about 200 tons of copper ore a day. Near it is the Fortuna, which is developing a similar deposit. In this vicinity it is also the experimental mill of the Boston Consolidated, where that company has been determining the best method for milling its porphyry ore.

Then one comes to the large porphyry ore deposits of the camp, namely those of the Boston Consolidated and the Utah Copper Company, both of which companies are erecting large mills. Steam shovels are to play a conspicuous part in the mining of these ores.

On the Starless group, just below the Utah Copper Company, Col. E. A. Wall is working 15 men, developing the northern extension of the porphyry, which is 400 ft. wide in the Starless. It is opened up by a cross-cut tunnel, 250 ft. below the surface, and a second one has just been started at a lower level. An 8-drill compressor has just been ordered. Colonel Wall plans to put up this summer a concentrating mill to treat the ore from the Starless group.

At the head of Copper gulch is the Dalton & Lake group of mines, belonging to Bingham Consolidated Company. There are three veins in this property, the Lark, the Lead vein, and the Brooklyn. These are worked by shafts and tunnels in their upper part; in the future they will all be mined through the Mascot tunnel, which is 8000 ft. long where it cuts the Lark vein at a point 1400 ft. below the surface. The Lark vein has been opened up for 2500 ft. The Mascot tunnel is extended some distance further and catches the Lead Mine vein. The Brooklyn vein is cut before the Lark is reached. Electric haulage is used in the Mascot tunnel. These deposits are all replacements in the limestone and have an east and west strike and dip 30 to 40 deg. to the north. The Brooklyn and the Lark are both copper mines. The ore goes about 3 per cent. copper with about $1 gold per ton and 6 to 12 oz. silver The company produces about 500 tons of copper ore a day. The lead ore from the Lead vein is high-grade, carrying 20 per cent, lead, 14 to 18 oz. silver and considerable gold. Square-set and stull timbering is used in mining these deposits, but in some of the stopes a caving system may be used.

By virtue of the deep cañons and the steep topography of the Bingham district most of the mining is done through tunnels. Square-set timbering is mainly used, but in a few cases the caving system of mining is employed, and the steam shovel is to do a good deal of the mining in the near future

The miners at Bingham are mostly foreigners and are not particularly skilful. The wages are about as follows per shift of eight hours: Shovelers, $2.50; machine men, $3; helpers, $2.75; timbermen, $3 to $3.50; single jackers, $2.75 to $3.

There are two long aerial tramways in the district, viz., the United States, which is about 4.5 miles long, and the Highland Boy, which is 12,000 ft. long; both are of the Bleichert type. The Copper Belt Railroad and the Shea engine play an important part in the development of the district; in fact mining at Bingham would be greatly handicapped if it were not for the Shea engine, for the grade up to the Utah Copper Company's mine is in some places over 7 per cent. and averages 5 per cent. while the track up Carr Fork averages over 4 per cent., and the new road that the Boston Consolidated is putting in to its porphyry deposit comprises several switch-backs having a 7 per cent. grade, which aggregate over a mile in length. Fortunately, the road where most of the hauling will be done in stripping the deposit averages only about 2 per cent. Of course, only the empty cars have to be hauled up these grades, except when taking up such supplies as coal and timber. However, with a train of empty cars the engines do considerable puffing.

Working under High Air Pressures.

BY MATTHEW VINGOE.

On account of the extended tunneling operations beneath the Seine, for the various lines of the Paris Metropolitan railway, the Prefect of the Seine thought well to obtain the opinion of a committee appointed to consider the hygienic conditions of the workers in compressed-air workings, and to this end a commission, composed of Drs. Armand Gautier, Roux, Haller and Walckenar were appointed early in the year. The report of this committee has been presented to the Academy of Medicine and contains the following conclusions:

1. That so long as work in the compressed air is done, as at present, under pressures less than 2 kg. per square centimeter above the surrouding air pressure the duration of work may be the same for the workmen as in work in the open air.

2. It would be an advantage from the point of view of the health of the tunnel workers that they be submitted but once during 24 hours to the change of pressure necessitated by work in the caissons. The duration of work should be a maximum of 10 hours consecutively, including time of entering and leaving the caissons.

3. In case it is necessary that the workmen start work twice within 24 hours a complete repose of eight hours at least is necessary between such starts. In any case overwork and accidents can only be avoided by the observance of the rules indicated below.

4. Medical inspections, periodical and frequent, are essential to verify the physical aptitude of the workers for work in compressed air, as much for new workmen as for the experienced workers engaged.

5. The duration of the period of entrance and exit from the workings by stages should not be less than five minutes per kilogram pressure.

6. The exit from the pressure should always be long and progressive and such dispositions should be taken that the pressure should not be equilibrated in less than four minutes. An experienced and responsible man should be appointed to oversee the duties connected with the equilibrating of the pressure.

7. In each caisson a medical post should be established for immediate needs.

In view of the importance of these recommendations, which are subscribed to by the best medical men in Paris, it is highly probable that they will be accepted in their entirety for the compressed-air workings beneath the Seine.

The Gulf Oilfield.

SPECIAL CORRESPONDENCE.

General conditions in the Gulf coast oilfields remained unchanged during the first half of July, the production being about the same as on June 30. The Humble yield declined 1000 bbl. daily, while the other fields made good the deficiency. Credit balance quotations and contract prices remain unchanged and nothing in the way of development indicates any large increase or decrease in output. Unless new fields are located the coast region will show a vastly decreased production this year, compared with that of 1905. The Texas production for the first six months of the year shows a decline of over 10,500,000 bbl., and Louisiana a reduction of nearly 2,000,000 bbl. The approximate consumption for the half-year to June 30 is 4,500,000 bbl. more than the output for the six months, so that stored oil has decreased to 15,500,000 bbl. By far the larger proportion of this is held by, or is under contract to, the refineries. Consumption remains normal, while the output declines, so that prices are firm, and likely to advance.

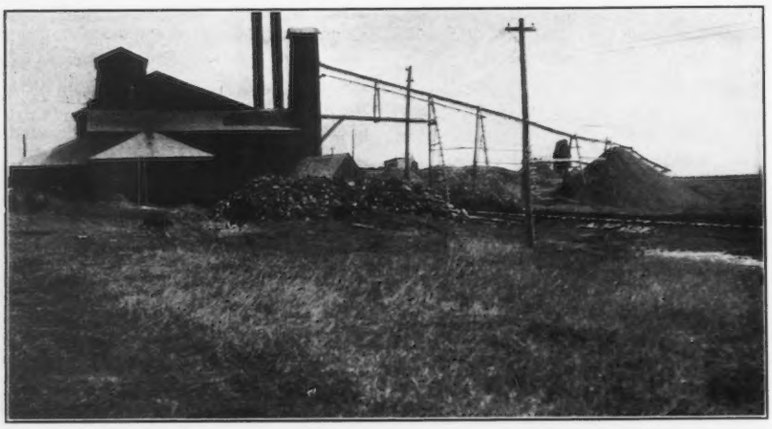
According to the London *Iron and Coal Trades Review*, the survey of the known manganese ore deposits in India recently carried out by the geological authorities shows the existence of ore in quantities sufficient to meet the large export trade in the richest varieties for many years to come, and of practically unlimited quantities of lower grade, which at present prices would not pay for the high transport charges to Europe and America, but would be available for the requirements of steel manufacturers in India. In the course of the survey valuable data have been obtained with regard to the geological relationships of the orebodies and a number of new varieties of minerals were discovered.

The Wisconsin Zinc Fields—I.

SPECIAL CORRESPONDENCE.

HIGHLAND.

Highland is the most northern camp in the district. Here there are large dry-bone workings and one mine producing blende, viz., the Highland. Another company, the Milwaukee-Highland, has developed a disseminated orebody, which is said to be 5 or 6 ft. thick, but it has not yet been much explored. The Highland mine, which was formerly worked for dry bone, now has both disseminated and sheet blende.



HIGHLAND MILL, HIGHLAND, WIS.

The Highland deposit runs on a ten o'clock range. The main orebody rests right on top of the oil rock and is a "flat," about 350 ft. wide, which has been developed for several hundred feet along its length. The disseminated ore averages from 15 to 20 per cent. blende and is from 6 to 7 ft. thick. The disseminated ore carries some lead, especially near small, tight crevices which come down from above. About 15 to 18 ft. above the oil rock is what is known locally as the green-rock opening, where disseminated ore and some sheet blende occur. The sheets are generally from 2 to 4 in. thick and are found generally one above and the other below the disseminated ore, which is a foot or two thick. About 3 or 4 ft. above the green-rock opening there is a sheet of blende 3 or 4 in. thick, of unknown extent.

The mine is opened by two shafts; one of these is used for developing the orebody, while the other supplies the mill. The main shaft, 5x8 ft. in the clear, is 80 ft. deep.

Much development has been done, the general plan being to mine the orebody retreating. However, in order to pay expenses some rooms have been opened up. The plan of mining retreating is to take out the lowest deposit as wide as it extends. The waste is piled into pillars to support the roof, with a post and headboard at each corner of a pillar. When enough ground has been opened, the pillars will then be partly torn down and if necessary the timbers blasted out. This will allow the roof to cave and open up a crack above the top sheet of the deposit. It is proposed next to work back through the caved block and begin to mine the upper sheet retreating, the ore being shot so as to break to the open space above the caved block, the feasibility of this method of mining has been shown on a small scale in a neighboring mine by Will Kennedy and his father, the late Richard Kennedy. However, all the details of this method of mining have not yet been worked out. Much depends upon whether the cap rock over the top sheet of ore is strong enough not to let the cave go clear to the surface. In case the caving is too slow one of the sides will be weakened by a series of raises so that caving will be helped along.

The ore is hoisted to surface in tubs holding 500 to 600 lb. The drilling is all done by hand, 15 to 20 ft. being drilled by two men in a shift, using ⅞-in. steel. Forty-per cent. dynamite is used, it taking about 25 lb. of powder to break the 65 to 75 tons of rock which are hoisted in two 8-hour shifts. In the production of this ore the following men are employed:

20 miners, 8 hrs. at $2.00	$40.00
10 shovelers, 8 hrs. at $1.50	15.00
2 hoisting men, 8 hrs. at $2.00	4.00
Labor expense mining 70 tons	$59.00

This makes a cost of about 84c. per ton for labor. Powder costs 12c. per lb., coming to about 5c. per ton of ore. Caps and fuse make another 2c., so that the total mining cost is about $1 per ton.

The Highland mine is equipped with a 100-ton mill, which has a rougher and a cleaning jig, and two Overstrom tables. The tables treat the slime from the classifiers. The lead is taken out on the first table and the blende on the second. This mill is of the general type used in the district and so will not be described in detail. The power plant consists of two Babcock & Wilcox boilers of 125 h.p. each. These are the only Babcock & Wilcox boilers used in the mills of this district; they have not given satisfaction owing to the bad character of the water. Boiler compound is used to prevent the scale, but nevertheless there is difficulty. Formerly it took only six tons of coal to generate the steam necessary, but at present 10 tons of coal are required. This runs a small hoister and also runs a 175-h.p. Corliss engine which drives a 100-kw. dynamo. This dynamo is used for running a 75-h.p. motor, which operates a 5-in. crosshead pump to deliver water to a pond for use in the mill. The dynamo also furnishes power to another 50-ton mill, which is used to concentrate dry-bone ore from a neighboring mine, and also to the small electric hoist at the other shaft. The 175-h.p. Corliss engine also drives the 100-ton mill at the Highland mine.

The mill produces the following concentrates in the two 10-hour shifts: Jig-lead sulphide, 1500 to 2500 lb. a day; table-lead sulphide, about 1000 lb.; jigs, 7 to 13 tons blende, assaying 46 to 57 per cent. zinc, 4 to 11 iron, 2 lime, 0.65 lead; Jack table, 0.5 ton blende, assaying 38 to 45 per cent. zinc.

GLANVILLE MINE, NEAR LINDEN, WIS.

This mill shift is composed of one jig man, one feeder and one wheeler, who are paid as follows:

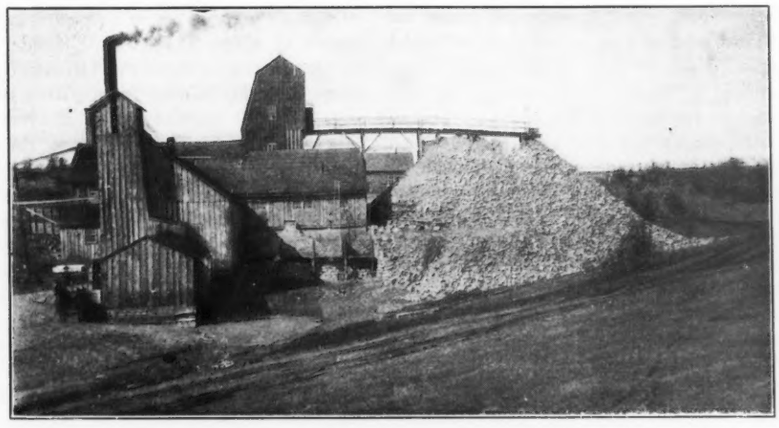
2 jig men, at $2.50	$5.00
2 wheelers, at $1.75	3.50
2 feeders, at $1.50	3.00

This totals $11.50, so that the labor cost of milling is about 17c. per ton. The

engineer and fireman get $65 and $45 a month respectively, so that, as there are two shifts of these, the labor to produce the power costs about $7 a day. The coal costs $30 a day at present, so the total cost of producing the concentrated ore is about $121. Consequently, it costs about $10 per ton to produce the finished ore, without allowance for repairs and renewals, administration, general expense, etc.

LINDEN.

At Linden there are three producing mines, viz. the Ross, the Mason and the Glanville. The Trio mine is finishing its mill and will soon be producing.



ROSS BROS. MINE AND MILL, NEAR LINDEN, WIS.

At the Mason mine they are working in two places, one from the incline shaft, near the mill, the other at the vertical shaft near the town. The vertical shaft is connected with the mill by a tramway about ½ mile long. From the incline shaft they are working a brangled orebody just above the oil rock. Only a breast about 3 ft. high is being carried. The underlying soft clay bed is picked out by the men lying on their sides; then a hole is drilled over the orebody which is pretty well concentrated in seams over a width of about 8 to 12 in. The drilling is done with little Jap drills and no trouble is experienced in drilling a hole 3 to 3½ ft. deep. The ore is then broken down by firing the hole above it. The waste is sorted out as much as possible. There are about eight men working from this shaft and about 20 tons of dirt is hoisted per day.

At the vertical shaft about a third of a mile to the east an orebody below the glass rock is being worked. The central part of this orebody was worked out years ago. It was composed of rich sheet ore which averaged about 60 ft. in width. At present they are working out the lean brangled orebodies, which are on either side of the old worked-out central part. These are about 300 ft. wide from one side to the other, including the worked out central portion. They are about 6½ ft. high and average about 7 per cent. zinc. All the ore is mined advancing. The roof is supported on oak timbers about 12 in. in diameter, placed about 8 or 10 ft. apart. Three 2¼-in. Ingersoll-Sergeant drills are used. These drill from 40 to 50 ft. of holes in a shift, the ground being quite fitchery. About 30 lb. of 40-per cent. powder is used to break 60 tons of rock. The underground force consists of six drill men, eight muckers, two car men and a timber man. The mine is opened by a shaft 5x10 ft. in the clear and 77 ft. deep. Tubs holding 1000 lb. are used for hoisting. The hoisting and pumping are done by electricity. The mine works only a day shift of eight hours.

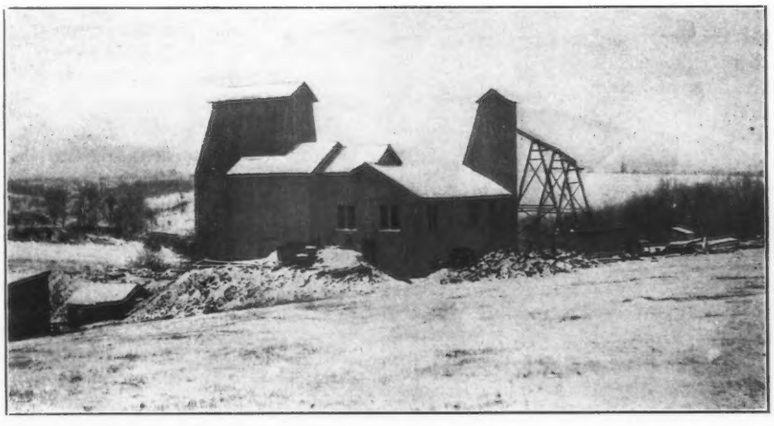
The mill is capable of treating 100 tons in 10 hours. It has a crusher, two rolls and two jigs. All the screen work of the cleaner is sent back to the chat rolls. The first cell of the cleaner makes a second grade of concentrate which is kept apart. The hutch-work from the rest goes into an elevator which raises it to bins above the railroad track. The mill treats 80 tons of rock in a 10-hour shift. The mine rock varies from 5 to 10 per cent. zinc, and averages about 7 per cent. The concentrates amount to about five tons a day. The tails at the Mason are said to carry about 1.3 zinc and the saving of mineral to be about 87 per cent. The Mason concentrates average about 35 per cent. zinc, 17 iron, 1 lime and a trace of lead. The second-grade concentrates, which are kept apart, average about 30 per cent. zinc.

The cost of mining and milling are given as follows per ton of dirt mined: *Mine Costs*: Superintendence, 1.8c.; machine drilling, 26.4c.; shovelers, 16.2c.; car men, 11.2c.; timber men, 3.1c.; repairs, 6.8c.; candles, 1.5c.; powder, 6.0c.; caps, 3.0c.; power, 39.8c.; total, $1.158. *Mill Costs*: Superintendence, 1.8c.; mill men, 7.3c.; crushing man, 2.5c.; repairs, 1.7c.; power, 12.8c.; miscellaneous, 3.0c.; total, 29.1c.

At the Ross Bros. mine near Linden they are mining a sheet deposit lying right above the oil rock in the green-rock opening. The top flat is 130 ft. wide on the east end, but is only about 60 ft. wide at the west end. The deposit runs east and west and has a north and south pitch. On the east end there are two sheets which are 2 or 3 ft. apart; the top sheet is about 8 in. wide and the bottom one about 4 in. At some places there is a third small sheet. At the west end the sheets are about 2½ ft. apart and both average about 4 in. thick. The mine has been worked about 250 ft. along its strike.

Four 2¼-in. Ingersoll-Sergeant drills are used and 35 to 40 ft. of holes are drilled and blasted per shift. The holes are put in about 6½ ft. deep. The back is carried about 6½ ft. high and it takes three holes to break it out. They use about 30 lb. of 30-per cent. powder per shift. The waste is sorted out and packed away in pillars so as to hold the roof. Posts with a cap are used in some places.

There are six machine men, four trammers, 10 shovelers, and four men packing away waste. Each man gets $2 for an eight-hour shift. About 50 tons of rock are mined per day.



IRIS MILL, NEAR LINDEN, WIS.

The deposit is opened by a vertical shaft 75 ft. deep. The ore is hoisted to surface in 500-lb. tubs. The ore is cobbed and hand picked. About three tons of cobbed ore are produced a day. It costs $5 to $6 per ton to cob the ore. Only the coarsest jack is cobbed out. The rest is sent to the mill. The mill is run about three days a week and produces 16 to

17 tons of concentrates when run. This mill is of about 60-ton capacity, consisting of a Blake crusher, two sets of rolls, a four-cell roughing jig and a seven-compartment cleaning jig. The shifts in the spalling sheds and the mill are all day shifts of 10 hours.

The cobbed ore assays from 60.5 to 62.5 per cent. zinc, 2 to 3 iron, a trace of lead and from 1 to 2 lime. The concentrates assay about 31 per cent. zinc, a trace of lead, and about 1.5 lime. The mill makes some lead ore, but it does not amount to very much.

At the Glanville mine, near the Ross, a sheet deposit above the oil rock is being worked. It is opened by two shafts, about 115 ft. deep. The sheet just above the oil rock varies from 7 to 14 in. in thickness, and carries some galena and iron sulphide. Underlying the glass rock is a sheet which varies in thickness from 3 to 6 in., averaging about 4 in. It was formerly worked, but is not now.

Gold Mining in Korea.

BY J. H. CURLE.

Korea is now under the political control of Japan. One of the first acts of the reconstructed Korean Government is to be the drafting of a mineral law, after which the country will be thrown open for mining. It is generally assumed by foreigners in Korea that when the new law is promulgated, it will be found that Japanese financiers and other Japanese who have a "pull" with the Korean Government are in possession of all the mineral areas that are worth locating. This may turn out to be the case, or it may not; but it should be remembered that the Japanese have neither the capital nor the technical skill available for this class of venture, and that they will surely have to sell out eventually to either British or Americans.

Most of the supposed best mineral prospects in Korea are now the property of the Imperial Korean Household, and the manner in which these assets are handled will give evidence of the attitude of the Japanese Government both toward Korea and to foreign enterprise in that country. Here, again, the foreigners in Korea are pessimistic, and hold the idea that concessions to work the Household mines will be given, in the first place, to Japanese, irrespective of applications from foreigners. That is one aspect of the mining situation in Korea. It does not, however, touch the really important side of the question, which is: What is the value or probable value of the Korean mines? The answer to that I can give. There are several good gold mines in one district in northern Korea. These are owned, and are being worked by, an American company. Other mines, whether gold quartz, or placer, copper, or coal, or any other mineral, are yet in the prospect stage. None of these is sufficiently developed to speak with certainty about, and none is yet worth buying, except at a small figure. The history of foreign mining enterprise in Korea up to the present is a short one. A few years ago three mining concessions were given—one to Germans, one to British, and the third to Americans. The German concession proved valueless from the start. The British concession contained one mine which had some value, but so much money was squandered on it by the first management that it yielded no actual profit. This mine is now exhausted. The American concession, the property of the Oriental Consolidated Mining Company, of New York, is of considerable area, and carries a number of quartz reefs, of which about a dozen have been, or are being, worked. There are five mills on the concession, aggregating 220 stamps. To date about one million tons have been crushed, yielding an average recovery of about $8 a ton, and there are about one million tons of ore reserves, which will yield about $5 a ton. Most of the smaller reefs worked are now showing signs of exhaustion, but it is only fair to say that the largest mine—in which over half-a-million tons are exposed—still looks well in the bottom, and that there are still numerous unworked reefs on the concession, some of which may prove valuable. The present costs on this property are about $2.22 per ton; but if it were possible to concentrate the plant into one unit, instead of there being five or six mines and mills at work, the costs would not be over $2. At its present capitalization, the Oriental Company shows about 50 per cent. of profit in sight to market value. Such figures, as shown by the cost sheets of these American mines, together with my recent inspection, lead me to make the statement that Korea is one of the most favorably situated countries for mining in the world. The climate is healthy, water is plentiful, and in cases can be used to generate power. The labor is undoubtedly the best cheap mining labor there is. The Korean miner, for a wage of 20 to 25 cents, renders a surprisingly good day's work; he is intelligent, muscular, fond of work, and tractable. The roads in the country are poor, and in the rainy season not passable; but the transport problem is simplified by numerous tidal rivers, which penetrate the mining districts, and by the lately built Japanese-owned railway, which runs through Korea from north to south. As a rule, there is scarcity of wood fuel, and the value of the several deposits of coal are not yet demonstrated. It is possible that for this commodity some of the districts would have to draw on the forests of the Yalu, in the extreme north, and this same source will, no doubt, be tapped for a supply of mine timber. But, taken all in all, the economic factor is excellent, and, given orebodies of good size, exceptionally low costs may be relied on.

The position in Korea, therefore, stands thus: The country offers fine mining conditions, and is about to be thrown open; but as against this it is correct to say that there are no proved mines to offer to foreigners. There is no reason why foreign capital should not participate in the development of Korea—but let it participate on the basis that the mines have yet to be found, that the capital put up is to do prospecting work—not to be handed over to Japanese concessionaires or company promoters—and that gambling in Korean flotations is quite unjustifiable.

Korea's present yearly output of gold is placed at about $2,250,000. Of this, say, $1,250,000 comes from the Oriental Company, and the balance from placer working, which is carried on by the natives. These placers belong mainly to the Imperial Household, and it is thought they are susceptible of being worked profitably on a larger scale; but this is surmise only. The Koreans, in primitive fashion, mine and smelt some copper in the northeast districts, but there is no evidence that these copper mines are of permanance. As to coal, its existence is known in several spots, and the Japanese are mining some for the railway. It is likely that, for strategic purposes, the Government will keep coal mining as a monopoly.

Protective Measures in Rescue Work.

The interest now evinced in all devices and inventions that are designed to aid in rescuing entombed miners after explosions, has extended to arrangements whereby the explorer can communicate with those on the surface. This is accomplished by the rescuer carrying a cable with him, attached to a portable telephone.

In this connection, it has been recently suggested that a special form of microphone be placed on some convenient artery, and connected to the telephone cable. A surgeon or trained assistant on the surface and at the other end of the line, would be able to know by the sound in the telephone, the actual condition of the explorer to whom he was connected. A somewhat similar arrangement might also be connected to some part of the breathing apparatus so that the labored breathing which accompanies exhaustion could also be read in time to send aid.

The value of aluminum in brass alloys lies in increasing the tenacity of the metal closing the grain and giving a higher color.

It has been found that the strongest copper and zinc alloy has the composition of about 55 per cent. of copper and 45 per cent. of zinc.

Notes on Car-Wheels.

BY REGINALD MEEKS.

Many years ago, in the "dark ages" of foundry practice, it was popularly believed, by makers of castings, that coal from the seacoast of England was the only coal suitable for foundry facing. Hence the name "seacoal," which is extensively used today, although ordinary bituminous coal is employed for the purpose. The term "ordinary" may be used literally as well as figuratively, because the quality of some facing is often far from being suitable. Coal analyzing close to 2 per cent. sulphur has come under my observation, and it is in connection with facing of this quality that the following data have to deal.

The castings made in the foundry, using this particular facing, were cast-iron car-wheels weighing 600 lb. Before proceeding further, the method of taking a sample

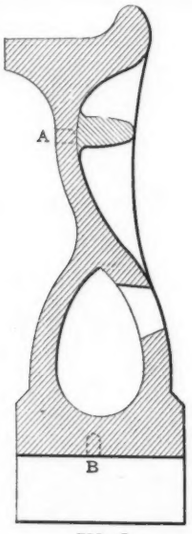


FIG. I

from a car wheel for chemical analysis should be explained. Usually the wheel is first subjected to the drop test and a broken piece is drilled to obtain the chemist's sample. Fig. 1 shows the cross section of one-half of an ordinary car wheel. A ½-in. drill is used and borings are taken from the "single plate" directly over a bracket. The borings from the first few turns of the drill are thrown away so as to avoid silicate of iron, or "skin," and then the drill penetrates ½ in. into the iron. The part sampled is indicated at *A*. This is on the cope or face side of the wheel, and this part of the mold receives the most attention from the molder and the "strongest" facing.

If, then, the facing contains more "seacoal" and this in turn is high in sulphur, the iron at the point *A* should tend to absorb more sulphur than at a point less exposed to sulphurous material. The portion of the wheel least likely to absorb sulphur would be the hub of the wheel, for two reasons, viz.: because of the greater volume of metal, and because it comes in contact with a dry sand core. Finally, the test bars formed from the same metal, but in independent molds, should be free from this absorptive capacity.

Accordingly experiments along these lines were conducted on six wheels, with the following results: In each case a sample was taken from the wheel at the points *A* and *B*, and also from the corresponding test bar. The popular idea is that a car wheel is made of particularly pure low-sulphur iron, but that this is far from being true may be seen from the following analyses:

SULPHUR PER CENT.

Wheel.	Plate at A.	Hub at B.	Test Bar.
No. 1	0.249	0.215	0.198
2	0.239	0.215	0.202
3	0.262	0.216	0.206
4	0.236	0.208	0.198
5	0.239	0.214	0.188
6	0.241	0.224	0.183
Average	0.244	0.215	0.196

It will be seen that in every instance the sulphur in the bar was lower than in the hub sample, while the plate showed considerably more than either. That the high sulphur in the plate was due to absorption is evident, because all other conditions were constant, and the hub had no means of absorbing sulphur, while the plate had every oportunity to do so. Assuming that the molten metal contained, on an average, 0.196 per cent., the sulphur absorbed by the plates must have amounted to 0.048 per cent.

As the single plate is the weakest portion of a wheel, it is obvious that such a weakening influence should be reduced to a minimum, and it behooves the car-wheel manufacturer and makers of castings, on which human life depends, to check carefully not only their purchases of facing, but also the use of it by the molder, who generally prefers to guess at the proportion rather than take the trouble accurately to measure out the coal.

The Bischof White-Lead Process.*

BY SIR WILLIAM RAMSAY.

This process consists in preparing hydrated lead-oxide in a very fine state of division; this is then carbonated. After many years of experimenting by Professor Bischof, works (capable of making 20 tons of white-lead per day) have been built, at Brimsdown near London, by the Brimsdown Lead Company, Ltd.

The first step in the Bischof process is the conversion of lead into litharge, by the usual plan of heating in an oxidizing atmosphere. The litharge is ground in a dust-proof mill, and is then converted into "lead sub-oxide" (a body of uncertain composition), by heating it to a temperature of nearly 300 deg. C., in a current of "water gas." This gas is specially made by passing steam through heated charcoal. The water gas (consisting of hydrogen, and carbon monoxide with some di-oxide) is free from sulphur compounds which are deleterious in the process.

The lead sub-oxide is then moistened and oxidized to hydrated lead-oxide. This latter is suspended in a dilute solution of lead acetate, when, by agitation and mixture with carbon di-oxide, it is changed to lead carbonate. This is filter-pressed, the lead acetate solution being used over again.

The white-lead made by Bischof's process is the genuine $Pb_3(CO_4)_2(OH)_2$, and not $PbCO_3$, which has but little covering power.

To measure this covering power, two series of tests were made. First, weighed cards were ruled with black lines, and then painted till they showed to the eye equal covering power; they were again weighed, and the dry pigment calculated. Second, the contrasted pigments were weighed out in the proportions calculated from the first tests, and then painted on the cards. The results showed that it took 14 parts of the best "Dutch stack" white-lead to equal the covering power of 10 parts of Bischof white-lead. It is identical in composition with ordinary standard white-lead, but, owing to its method of preparation, has a greater covering power.

There are several interesting features connected with the works at Brimsdown. First, the lead fumes are kept from escaping to the atmosphere by passing the gases from the furnaces through several fans in series through which water is introduced. Second, the works are kept free from coal dust or soot, by using Mond producer-gas for power, the gas being made at some distance from the works. Gas engines are used to the total exclusion of steam engines.

Professor Bischof did not live to see the full success of his process, as he died in 1903, at the age of 69. He was appointed to the chair of technical chemistry at Anderson's College, Glasgow, in 1871. It is said that his father, the renowned professor of chemistry at Bonn, Germany, in his day also worked at the problem of manufacturing white-lead.

Platinum is most readily distinguished as follows: (1) By its great weight (in panning it remains behind even gold in the pan); (2) its white color; it is whiter than lead and is distinguished from amalgam by its smooth surface, whereas the surface of amalgam, as seen under a good glass, is rough; (3) its resistance to nitric acid, as compared with native silver or lead.

* Abstracted from a paper read before the Sixth Congress of Applied Chemistry, at Rome, Italy, May, 1906.

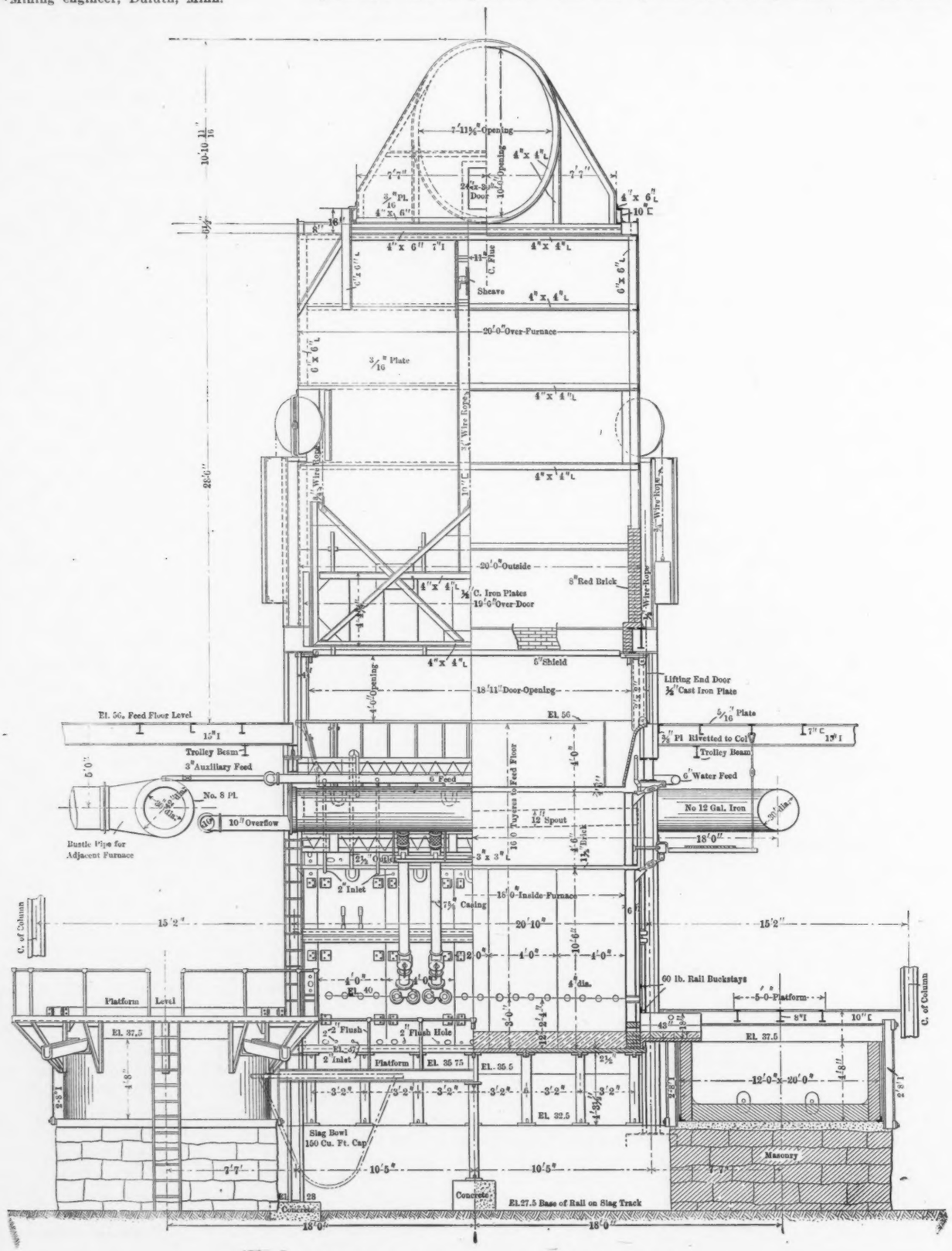
Arizona and Sonora—XI.

BY DWIGHT E. WOODBRIDGE.*

THE COPPER QUEEN SMELTER (CONTINUED).

The seven converter stands are operated by five engines, each with capacity of 650 cu.ft. per minute, and one with capacity of 1500 cu.ft. per minute. Originally the converters were arranged on the unit system, intended to run at constant speed and variable pressure. This did not prove to be of particular advantage and is now replaced by one main for all with capacity for 12 stands. A two-stage compressor with capacity of 2000 cu.ft. per minute is used to supply air for the pneumatic tamping machine at the relin-

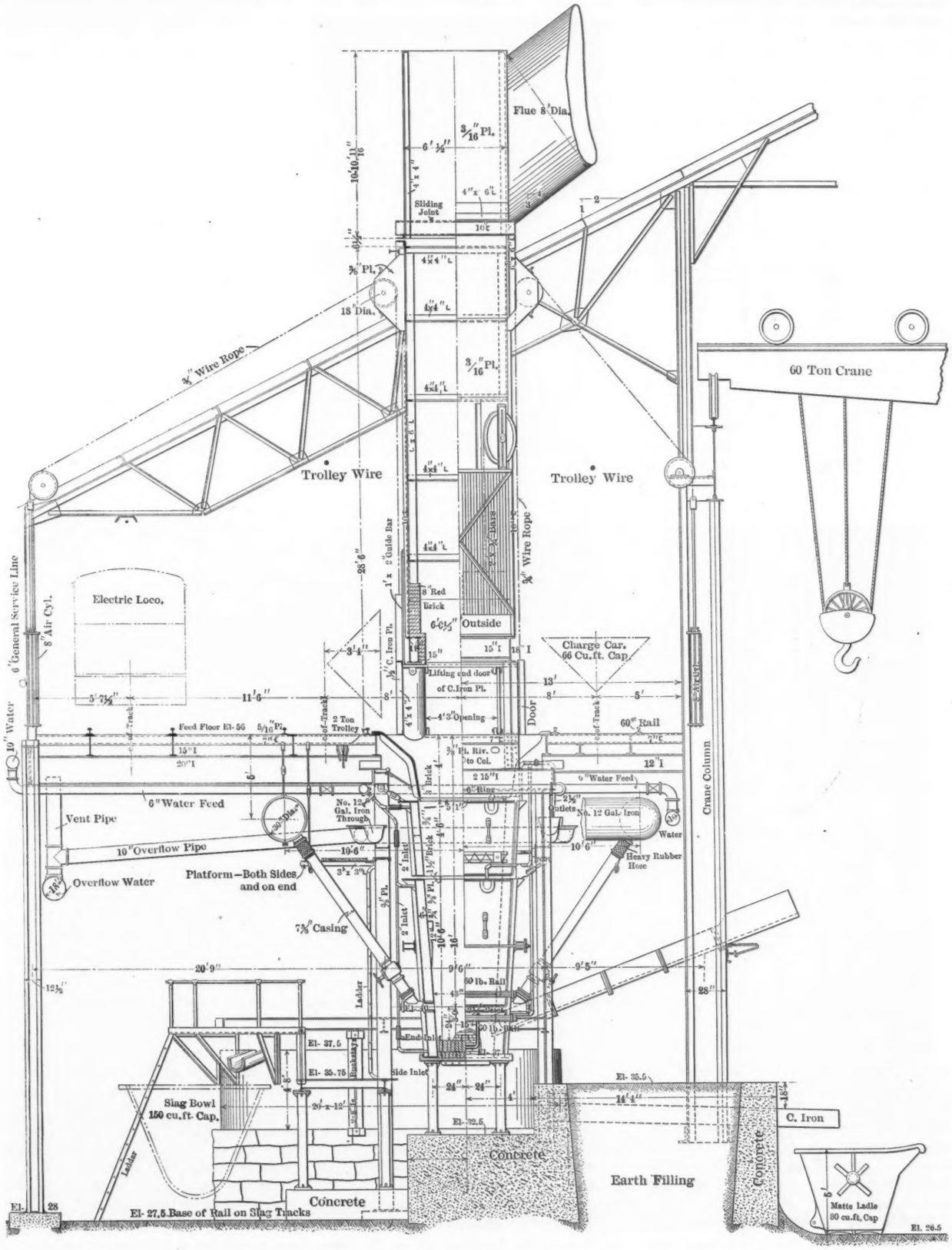
*Mining engineer, Duluth, Minn.



SIDE ELEVATION AND SECTION OF COPPER QUEEN BLAST FURNACE.

ing plant, to operate furnace doors, and pump water from the deep wells. All power for the entire works is generated in this central station, with electric distribution to all outside points. All secondaries, circulating pumps for condensers, feed pumps for boilers, etc., are operated by electric motors. The central electrical equipment consists of four cross-compound engines direct-connected to 400-k.w. generators, 250 volt, direct current. Two of these units can supply all the power needed, leaving two in constant reserve.

The plant is well equipped with boiler, machine and electrical shops and foun-

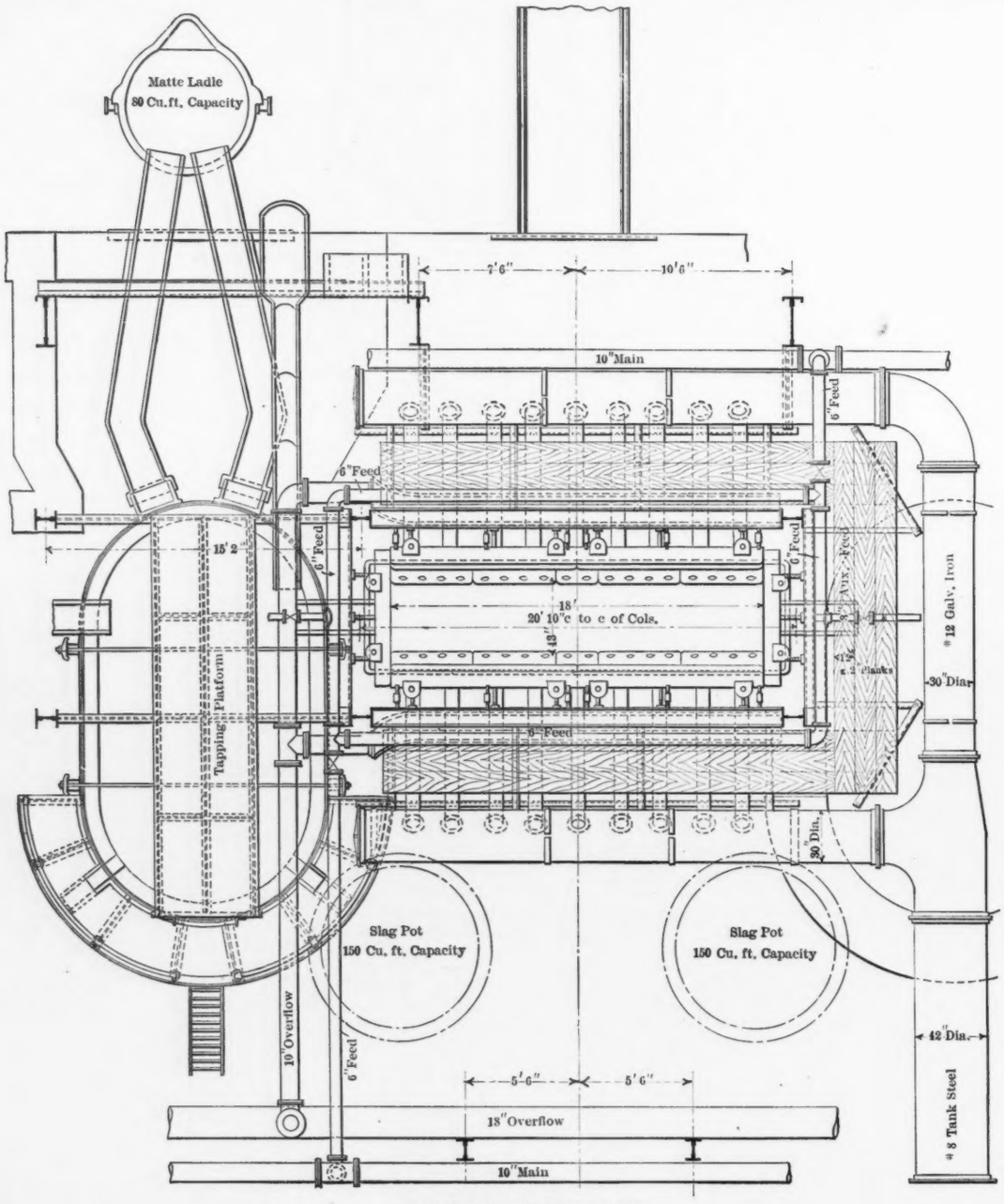


END ELEVATION AND SECTION OF COPPER QUEEN BLAST FURNACE.

dry, and has ample storage room about the shops for lumber and other material. It has been laid out on a broad and liberal plan, but so great has been the expansion already, that an addition equal to that made during the last year will leave little available space.

backs. So far, the slag has been used by the El Paso & Southwestern Road for ballast, and probably will be for some time to come.

Throughout the entire works the trackage system is standard gage, and same tracks are used about the pits for unloaders of the Vezin type. The works is not as mechanical as some, but the sticky and clayey character of much of the ore makes this unavoidable. It has at times been found necessary to dry ore from the mines by spreading it in the sun, before it could be crushed and rolled



PLAN BELOW FEED FLOOR

Water is secured from bored wells about 500 ft. deep. At that depth an abundant supply of soft water is obtained. It rises nearly to surface; indeed, one well drilled on somewhat lower ground has an artesian flow of about 200 gal. per minute. This well was drilled 1000 ft., but made no additional flow below the 500-ft. level.

Slag is taken from the settlers by trolley motors and the dump has been built on a 3.5 per cent. grade and with switching ore from the mines and for the charging buggies.

At present the capacity of the works is 3000 tons per day; but this will be increased to 4000 tons by the addition of the furnaces referred to above.

The sampling works, located near the ore pits, is a steel and brick building 65x 165 ft. in size. Three crushers and six sets of rolls are placed in one line along one side of the building, all on the same level, and there are two mechanical samat all. Concentrates and small lots are sampled by the regular cone and quarter system. All reject from the mechanical samplers discharges into side dump cars which go to the ore mixture in the pits, and thence with the regular charge to the blast furnaces.

On one side of the ore pits is a large ore storage, containing 70,000 tons of ore, under cover, as a reserve in case of temporary trouble at the lines or on the railway line connecting mine and smelting

plant. This storage may be untouched for years, or may be called into use instantly.

It is difficult for one who has not seen the company's former smelting works at Bisbee to appreciate the vastness of the undertaking that was planned, when the Copper Queen directorate decided to abandon that works and erect a new plant at Douglas. The entire works at Bisbee could have been set within the powerhouse of the new plant. There have been many changes and additions to the works since it started two years ago and with the additions now under way it will be one of the largest smelters in the United States. The policy of the company has been broad and it has not hesitated to make improvements, or increase the capacity, when increased tonnage demanded.

The Copper Queen Company kindly offers every opportunity to parties interested in the smelting business to see its works, and its officers are especially generous in their giving of information. The company is planning important additions to its works.

Experiments show a considerable gain in economy and output due to heating feed-water with live steam.

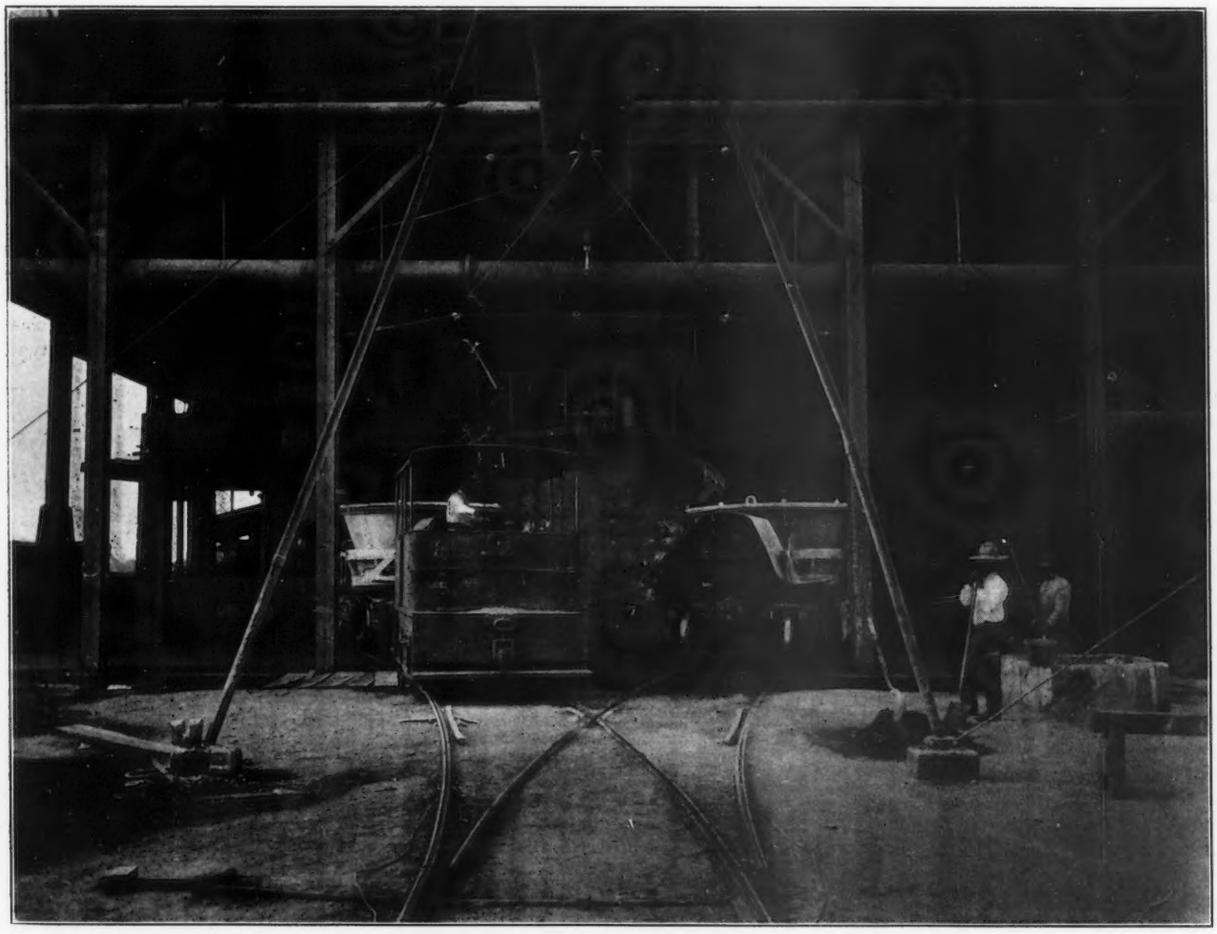
Petroleum Production in Germany.

According to J. I. Brittain, U. S. consul at Kehl, the petroleum industry of Germany would not pay expenses if it were not for the import duty on refined oil, which is $2.38 per 110 pounds.

FEED FLOOR SHOWING ELECTRIC LOCOMOTIVE.

The petroleum district contains three basins in the vicinity of Hagenau, Alsace, namely, at Pechelbronn, Biblisheim, Sultz, and Durrenbach. At present about 400 wells are being pumped; there are no flowing wells. At each of the above named towns a refinery is located. The wells are not large producers, the best pumping but 15 to 20 bbl. per day, while the less productive pump but 3 to 5 bbl. The oil is very dark in color, and the chemical properties are said to resemble those of the Pennsylvania oil, while the specific gravity is about the same as of the Russian oil. The crude oil contains about 35 per cent. petroleum, 45 per cent. vaseline and lubricating oil, 10 per cent. coke, 5 per cent. water, 2 per cent. benzine, and the remainder waste matter.

At present not many new wells are being drilled, as many of the wells recently brought in produce less than 10 bbl. per day, and a producer under that quantity does not warrant the expense incident to drilling a well, which is about 3,000 marks ($714). The average depth of the wells is about 1150 ft. The output of refined petroleum at the three refineries is about 20,000 tons annually.



SHOWING BASE OF TWO FURNACES, SETTLER AND SLAG POTS, WITH MOTORS AND TRACK ARRANGEMENT.

Test of Blast-Furnace Gas Engine.*

BY H. HUBERT.

The Cockerill company, the Belgian pioneer in the construction of gas engines driven by blast-furnace gas, instructed me to undertake, with Professor Witz, detailed tests on the 1400-h.p. two-cylinder, double-acting and tandem engine installed in their electric service. These tests were made January 9 and 10, 1906. Arrangements were made for measuring the gas consumption, a bell, holding about 300 cu.m., being provided for this purpose.

As the engine working at full load consumes about 2½ cu.m. per horse-power per hour, the bell was able to feed it only for a little more than five minutes. It was then raised again, the gas being pumped into it by an electric rotary-pump. In the interval, the opening of gas valves allowed the engine to take gas directly from the main, from which these same valves isolated it during the time of the trials.

The indicated work (i.h.p.) was determined by a large number of diagrams, taken by two observers. The useful work (effective horse-power, b.h.p.) was ascertained by means of the electric energy developed by a dynamo, of which the output had been carefully tested in advance for a series of powers. Samples of the gas were taken, for the determination of the calorific power, by the Witz bomb in the laboratory of Professor Witz at Lille University. The quantities of water used in cooling the different parts of the engine were measured, as well as their temperatures. It was not found practicable to take the gas at the outlet, because the water injected into the exhaust vaporized instantly and lowered the temperature.

The detailed results of these tests will be published later; but the principal elements, enabling the progress made since the commencement of this novel application of blast-furnace gases, and the enormous economy it has brought about, to be measured, are given in Table 1.

It is interesting to compare the results obtained by these trials with those obtained previously with engines made by the same company, as is done in Table 2.

These figures are significant. In comparing the trials of 1906 with those of 1900, which gave results which were considered excellent at that time, there was found a diminution of 15 per cent. of calories used per 1 h.p. For the brake horse-power the reduction attains 31.4 per cent. Finally, the thermal efficiency has been increased 18.4 per cent. The advance made is thus very considerable. The advantage obtained, as compared with the employment of steam, is by no means the least interesting of facts brought out by this investigation. Admitting, however, that a 70 per cent. efficiency is obtained by burning the gases under boilers, which is considered satisfactory, and that the steam raised amounts, according to Carnot's cycle, to an efficiency of 40 per cent. (between 200 deg. and 10 deg., which the cycle of Rankine makes 77 per cent. of that of Carnot), and finally that one could succeed in obtaining 80 per cent. of the Rankine cycle, the thermal efficiency becomes:

$0.70 \times 0.40 \times 0.77 \times 0.8 \times 100 = 17.25$,

which is lower, by 42 per cent., than that of the motor above described.

Assuming that a blast furnace producing 100 tons of pig iron per day produces about 9000 cu.m. of gas at 1000 calories, available for the production of power, by obtaining 2450 h.p. with the steam engine, and 4220 by using the gas direct in gas engines, there remains a difference of 1770 h.p. in favor of this new application over the results obtained by a first-class steam plant of the smaller (boiler) type.

Description of Test.	Indicated Horse-power.	Brake Horse-power.	Electrical Horse-power.	Mechanical Efficiency per Cent.	Electrical Efficiency per Cent.	Total Efficiency per Cent.	Consumption per Hour and per Horse-power (*cheval*) in Cubic Metres, at 0·02760 Millimetres per			Highest Calorific Power by the Witz Bomb per 3 Metres. Calories.*	Calories used per Hour and per			Thermal Efficiency per Cent.	Heat carried away by	
							Indicated Horse-power.	Brake Horse-power.	Electrical Horse-power.		Indicated Horse-power.	Brake Horse-power.	Electrical Horse-power.		The Water of Circulation per Cent.	The Exhaust Gas.
½ load	1250·48	986·00	917·5	78·7	93·1	73·3	2·513	3·187	3·425	979	2460·2	3120·1	3353·1	29·82	16	
¾ load	1463·88	1333·2	1250·7	91·10	93·8	85·4	2·313	2·540	2·707	963	2227·4	2446·0	2606·8	28·52	16·2	
Full load	1569·45	1466·15	1377·45	93·41	93·9	87·76	2·247	2·406	2·560	983	2208·8	2365·1	2516·5	28·77	20·2	
Full load	1607·74	1494·8	1404·7	92·97	94·0	87·4	2·325	2·497	2·657	943	2192·5	2254·7	2505·6	28·98		
Overload	1755·06	1581·9	1487·7	90·00	94·0	84·7	2·155	2·352	2·542	988	2129·1	2363·3	2511·5	29·84	20·2	

* This is greater than that given by the Junkers calorimeter.

TABLE 1.

No.	Description.	Date of trials.	Power		Consumption of Gas.		Consumption of Heat.		Thermal Efficiency. Per Cent.
			I.H.P.	B.H.P.	I.H.P.	B.H.P.	I.H.P.	B.H.P.	
1.	8 *Horse-Power Engine.*	1896	5·26	4	4·03	5·30	4030	5300	15·77
2.	200 *Horse-Power Engine.*								
	Single cylinder, single acting, constant admission . . .	19-20 July 1898	213·9	181·82	2·830	3·329	2775	83625·7	22·9
3.	600 *Horse-Power Engine.*								
	Single cylinder, single acting, constant admission . . .	20th March 1900	825·8	670·0	2·560	3·156	2520	13106·8	25·2
4.	200 *Horse-Power Engine.*								
	Single cylinder, single acting, variable admission . . .	2nd Decr. 1901	246·9	215·3	2·981	3·418	2766	3172	23·0
5.	1400 *Horse-Power Engine.*								
	Double-acting, tandem, variable admission .	9 and 10 Jan. 1906	1755·06	1581·9	2·155	2·392	2129	12363·3	29·84

TABLE 2.

*Abstracted from Professor Hubert's paper before the Iron and Steel Institute, July, 1906.

Conveying Coal to the Boilers.

BY F. W. PARSONS.

Various methods of supplying the boiler house with coal have been used with more or less success, and, until recently, the question of saving two or three cents per ton in handling was hardly considered. In this article I propose to deal particularly with colliery plants where coal is plentiful, and where the boiler house is almost invariably near the tipple and generally at a lower level than the tipple chutes. This permits the coal to be caught in the washery, at the slack-bin, or under the domestic tipple screens, and conveyed by a pan, belt, or flight conveyor to the points of dumping in the boiler house.

At some mines it is customary to fill a railroad car with slack and pea coal from the tipple chute, and then drop the car to the boiler house, where the coal is shoveled through openings to the pile in front of the boilers. Other methods of catching the coal in pit cars from a side chute at the tipple, and then tramming these cars into the boiler house where they are dumped, are also expensive and unsatisfactory where the power plant is large.

At one plant an arrangement was installed whereby the slack and pea coal, after being jigged and elevated to the top of the washery, was there deflected from the chute leading to the slack bin, and run into a wooden chute completely boxed and on a steep incline leading to the top and middle of the boiler house, where the chute was divided, one branch leading to one end and the other to the opposite end of the boiler house. An arrangement of this kind is simple, inexpensive, and in many cases fully answers the purpose. It is necessary in this case, however, that the boiler house be near the washery, and that the coal can be first caught at a high elevation to give the necessary inclination to the chute.

The most modern method of supplying coal to the boiler house is by means of mechanical conveyors of one of the types before mentioned. In recently considering the subject at a mine, it was decided to install a flight conveyor as being most suitable, the decision being partly influenced by the slightly less cost of such a conveyor as compared with a belt conveyor. It had been the practice at this mine to elevate the slack and pea coal to the top of the slack bins by means of a bucket elevator, and it there entered a cylindrical screen which separated the slack from the pea coal. In the chute leading to the screen a slide gate was placed, so that when the gate was thrown across the chute, the coal deflected into another chute which led to the end of the flight conveyor. This piece of conveyor ran due south a distance of 71 ft., where the coal dumped into another chute, which led it to the second conveyor running at right angles to the first. This second conveyor was 95 ft. long, of which, 79 ft. extended into the boiler house.

The conveyor trough in the boiler house, had three openings or gates, which, counting the dump at the end of the conveyor, allowed the coal to drop at four different points. When the conveyor was in operation, the first gate would be opened until the coal formed a pile under it. This gate was then closed and a second gate opened, continuing in this

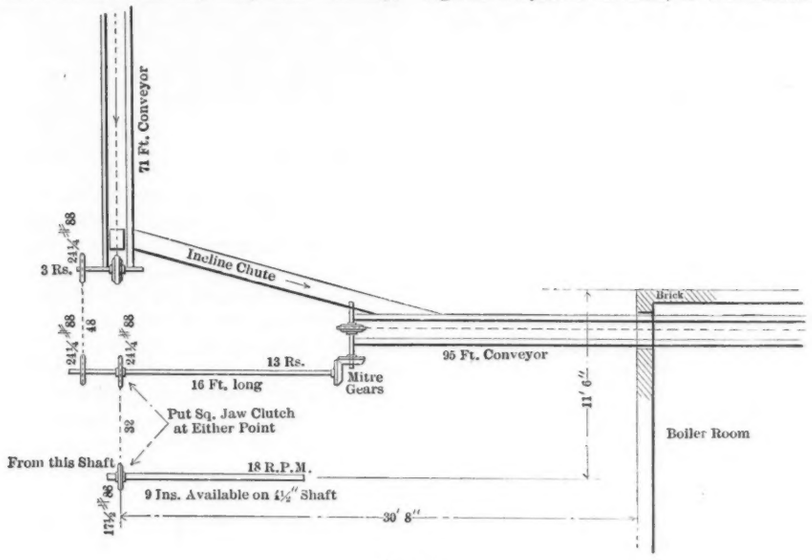


FIG. 1.

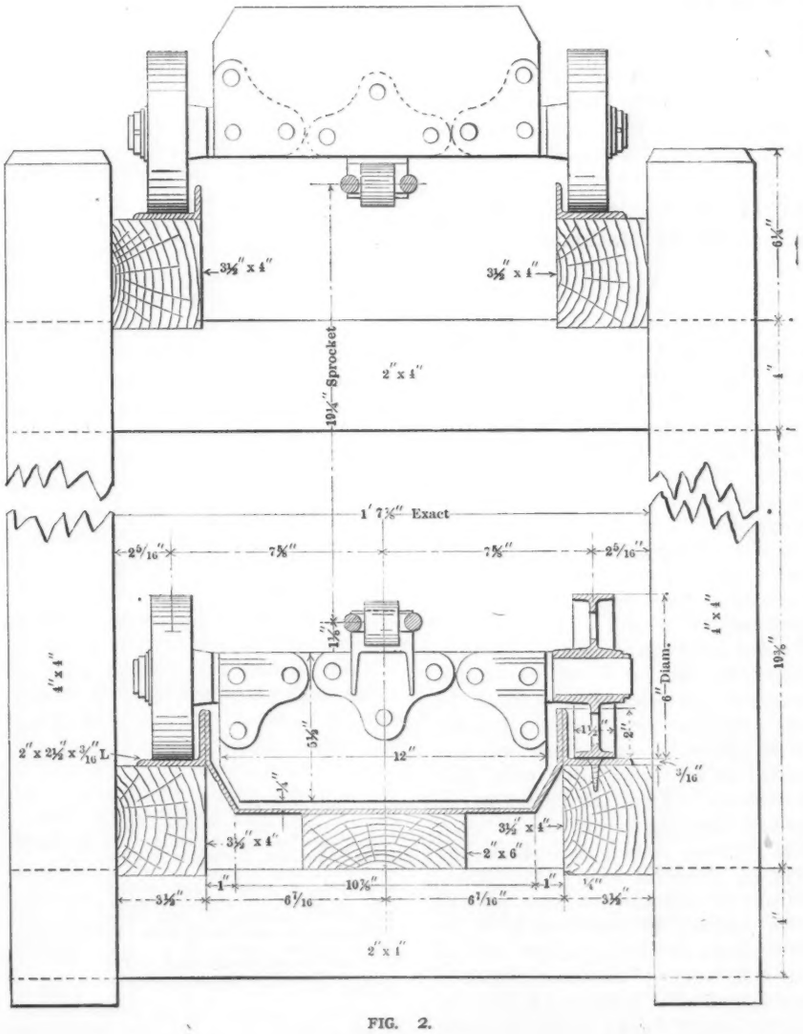


FIG. 2.

way until the coal heap was fairly uniform across the boiler house.

Concerning the size of conveyor necessary, it is a matter of speed as much as anything else that determines the capacity. However, where six or eight boilers are to be supplied, steel flights, 12x5½ in., with gudgeons and 6-in. rollers, are sufficiently large to handle all the coal necessary. Steel link-chain of good quality should be used, with attachments for fixing flights every 3 ft. The runway consists of No. 10 steel trough with 2x2½-in. steel angle tracks.

The cost of one 95-ft. conveyor, and of one 71-ft. cross-conveyor, including miter gears, countershaft, self-oiling pillow blocks, sprockets, etc., as here described, would be $475 f.o.b. factory. Adding $75 to this for driving machinery to drive from main shaft to countershaft, and from countershaft to head shafts of conveyors, also $175 for lumber, bolts, iron for chutes, etc., and $200 for erection, we have a total cost of $915 exclusive of freight.

In selecting a drive for these conveyors, it was decided to use an available 9-in. space on a 4½-in. shaft which was used for a tail-rope haul. The location of this shaft and the general method of driving are shown in Fig. 1.

In the erection of such a conveyor, much odd timber can be worked in without injuring the efficiency of the installation. Fig. 2 shows a cross section of a flight conveyor, illustrating a simple and satisfactory method of construction.

Cost of Installation and Mining Coal by Machines.

BY F. W. PARSONS.

There is no question of more vital importance to the coal operator than that which deals with the substitution of machinery for manual labor. There are no mines at present run as a matter of philanthropy, and no methods have been purposely adopted except where efficiency and economy of operation were desired and expected.

Machine mining is now an established practice, able to present statistics, proving its advantage over hand mining where normal conditions exist. There are certain indisputable facts connected with machine mining that cause the presentation of numerous problems of economy to the mind of the operator. Everyone familiar with the subject knows that machines will increase the production of a mine with fewer miners, and this point alone has in some fields been the hardest one to solve. Where a mining camp is isolated, and the miners are compelled to buy every necessity from the mine store, it is not unusual for the company to receive as profit on store dealings, as much as 25 per cent. of the monthly wages of the miner, especially where colored labor is employed. The rent from the miners' houses is also no small item of income. These revenues considerably reduce the cost per ton of mined coal, and in some cases make possible the profitable operation of a mine, when otherwise no surplus could be shown. How important this matter appears to some officials, may be judged from the fact that an effort is made to keep on the mine payroll, only those miners who deal exclusively at the company store. It is held, therefore, that the more workers employed, the greater are the profits. Notwithstanding this profit accruing from rents and furnishing supplies to the miners, it is now generally conceded that the saving resulting from the use of machines is so large that the cost of installing such a plant is justified.

Machines will undercut about 25 per cent. deeper than the hand miner, and this allows more coal to be shot down with the same amount of powder, besides furnishing the coal in better blocks. Undercutting by hand has always been attended with much danger, and the use of machines has largely decreased the accidents from this cause. A further advantage of machine mining results from the rapidity with which development can be carried on, which provides earlier dividends on the money invested.

The rapid advance this country has made in the use of machines, is evident from the statistics of the U. S. Geological Survey, which show that in 16 years, the amount of coal mined by machines has increased from 5 per cent., to more than 30 per cent. of the total bituminous output. In West Virginia during 1905, the machine-coal mined amounted to almost 50 per cent. of the whole, while in Ohio, during the same period, nearly 70 per cent. of the coal was machine mined.

In a recent pamphlet published by the Sullivan Machinery Company, a compilation of costs is given, which is interesting to those who are considering the installation of a machine plant. The results of practical investigation here given, show that in the Pittsburg thin vein of Pennsylvania, each mining machine will produce about 50 tons per eight-hour day, cutting 65 ft. of face to a depth of 5 ft. Twelve machines will easily mine 600 tons per day and three additional machines will take care of the narrow work. It will thus require a 15-machine plant to cut as much coal (700 tons) as is now produced by hand. The cost of a 15-machine plant may be summarized as follows:

Power plant, including boilers, air compressor, air receiver, feed pump and feed-water heater	$5,181.00
Mining machines, including all accessories, and freight	4,125.00
Installation of power plant, including freight, compressor foundation, boiler settings, wooden boiler and engine house, water tank, fittings, piping, labor, etc.	2,260.00
Pipe lines above ground and in the mine, with all fittings, labor and freight	2,484.00
Total cost	$14,050.00

The expense of maintaining and operating this plant may be approximately estimated as shown below:

Interest (6 per cent.) on investment, depreciation (10 per cent.), repairs and renewals on machines and power plant and extensions of pipe lines	$2,250.00
Fuel, 6½ tons per day of one 8-hour shift, at 50c. per ton, and oil and waste, 50c. per day; per year of 200 working days	750.00
One engineer at $75 per month; one machine boss and pipeman at $75; one blacksmith to sharpen picks at $60	2,520.00
Total maintenance	$5,520.00

The above figures are considered the maximum, so that in actual practice, the cost and maintenance of the plant will probably be lower.

If we assume the pick rate at this mine to be 60c. per ton, and the differential rate for the machine runner to be one-fifth of the hand rate, then the machine rate will be 12c., and the loading rate 30c. Adding 3c. for blasting makes 45c., leaving a margin of 15c. for profit and payment on the plant. With an output of 700 tons per day and considering 200 days in the year, the annual gross saving will be $21,000. If we now deduct the total cost of plant, including maintenance, from this saving, we have, $21,000 minus $19,570 which leaves a net profit of $1430 at the end of the first year.

In Illinois and other western or southern fields, the coal often averages 8 or 9 ft. in thickness, and the differential rate in favor of machine mining is only 7c. This would require about two years for the increased earnings resulting from the use of machines to pay for the machine plant and its maintenance. However, the advocates of machine mining claim that the factor making the use of machines profitable, is the increased percentage of lump coal which they secure, this increase in the percentage of lump being placed at more than 20 per cent.

Hydrogen peroxide is a good antidote for cyanide poisoning, but the remedy must be promptly and repeatedly applied at intervals of three or four minutes, by injecting the fluid hypodermically. Use a 2½ per cent. solution. It is also advisable to wash out the stomach with a 2 per cent. solution of the same antidote. Very few cases of cyanide poisoning are reported. Men engaged in the business all know the danger.

After determining the calorific equivalent of any coal sample by using a standard calorimeter, the evaporative power can be calculated by dividing the calorific equivalent by the latent heat of evaporation of water (537). The result obtained represents the number of units of water at 100 deg. C., which would be converted into steam at the same temperature by the combustion of a unit mass of coal.

Mine Car Wheels.

The wheels of mine cars are subjected to such rough usage from poor track and neglectful lubrication, that it is essential to design them strong enough to stand this rough handling with a minimum amount of repair.

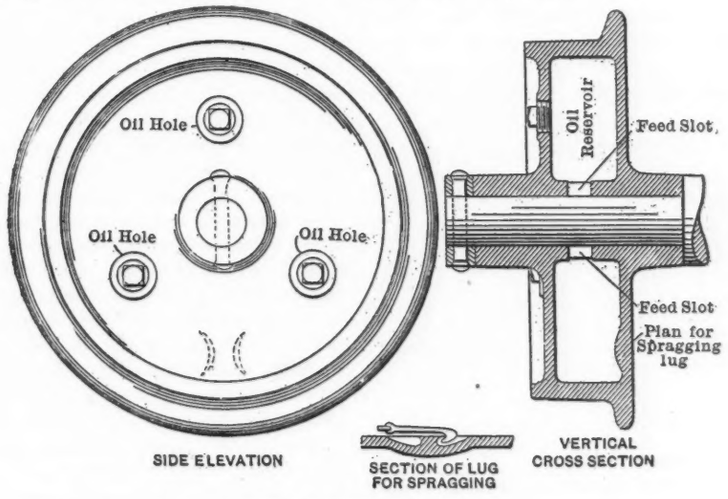
There have been many wheels designed and built for use in mine work, some of which have successfully met the conditions imposed. J. H. Aldrich, in the *Bulletin* of the American Institute of Mining Engineers, for July, 1906, has described a solid cast-iron wheel that has given satisfactory service at the mines of the Aldrich Mining Company in Alabama. This wheel is a solid casting, and with the exception of the oil plugs, has no parts which can be loosened or detached. The leading purposes of the design are to secure maximum strength for the weight of metal; uniform wear of parts, with ease and certainty of lubrication.

A proportional strength greater than that of wheels with spokes, is secured by bracing the sides of the rim with plates. Spragging may be provided for by means of a wedge-shaped lug in either web, with a hook adapted to catch and hold the wheel.

The strain is obtained by means of a hub presenting an integral bearing-surface, bisected by a vertical longitudinal plane through the center of the tread of the wheel. The pressure per sq.in. is, therefore, the same at all points of the bearing-surface; and the wheel moves in true alinement with the direction of motion of the car, until it is completely worn out.

For the purpose of lubrication, the wheel is cast with webs, inclosing a large oil-chamber, which extends from hub to rim, and is so large that three, or at most, four oilings per year will be sufficient. When so great a quantity of lubricant is provided, a method of feeding is obviously required which, while not liable to clog, will supply no more oil than is necessary, and will evenly distribute this supply. This is effected by one or more entirely open and unobstructed longitudinal openings or slots in the hub, leading directly from the reservoir to the axle, and so proportioned as to catch, as the wheel revolves, a suitable amount of the film of oil on the sides of the reservoir, and feed it to the center of the bearing-surface. When packing or waste is placed over or in the oil-ducts, they are liable to become clogged; and this liability calls for that closer attention to the wheel which it is desirable to render unnecessary. The illustration shows the excellent arrangement for self-lubrication, as well as the general construction of the Aldrich wheel.

It is of course obvious that no standard design of mine wheel can be built to meet the requirements in all mines, as the conditions existing are so variable; however, certain methods of construction when observed, are sure to increase the efficiency of operation.



ALDRICH MINE CAR WHEEL.

The hight of roadway generally governs the diameter of the wheel, but where possible it should be the practice to make the wheel as large as possible with a view of reducing friction. As to whether the wheel should be fixed or loose on the axle, that also depends on the existing conditions. If the roadway is uneven and curved, the loose wheel and axle possesses the advantage of offering small resistance in passing around curves. On a straight road, the fixed wheel causes less friction, and has the advantage of absolute trueness of gage. With loose wheels where washers and cotters have to be used, the cost of repairs is often considerable.

For very soft ground the diamond drill is not efficient, and if a hole is proceeding on that system, it is advisable to remove the crown and substitute percussion boring tools when the soft strata are encountered.

Natural-Gas Testing in Canada.

BY PHILLIPS THOMPSON.

Mr. McGill, assistant to the chief analyst of the Department of Inland Revenue, was recently commissioned to visit the Canadian natural-gas fields and report concerning the character of the product. This step was taken on account of legislation, by which natural-gas production has been made subject to the provisions of the gas-inspection act which apply to artificial gas. These are to the effect that gas shall contain no trace of sulphureted hydrogen; that it shall not contain ammonia in any quantity exceeding four grains per cu.ft.; or sulphur in other form than sulphureted hydrogen in quantity exceeding 35 grains per 100 cu.ft. Owners of natural-gas plants contend that as they do not furnish gas for illuminating purposes, but only for treating, it is unreasonable to subject them to the conditions imposed with regard to gas used as an illuminant. They also claim that to remove traces of sulphureted hydrogen would entail enormous expense by reason of the number of wells and their distance from each other. The ruling of the Inland Revenue Department as to the construction of the act was, that while nothing in the law would forbid the supplying of natural gas containing sulphureted hydrogen for fuel, yet if the owners supplied it to those whom they knew to be using it for illuminating purposes they could not escape liability by notifying their customers that they would not be responsible for its use in lighting. The natural and artificial products must, therefore, come under the same regulations and be put on the same footing.

Mr. McGill's report, which may be a basis for further legislation, states that the Essex fields, though practically nonproducing at present, may again be valuable sources of supply. The gas, however, contains a good deal of sulphureted hydrogen, analysis showing 261 grains per 100 cu.ft. The present large developments are in the Niagara peninsula, most of the gas being supplied by large companies. The Dominion Natural Gas Company, which supplies Hamilton, Brantford, Galt, Paris and other towns, has about 100 wells, the gas from which was found free from sulphureted hydrogen, with only traces of sulphur in any form. The output of the Provincial Natural Gas Company, of which a quantity is exported to Buffalo, in addition to supplying places along the Niagara frontier, generally contains traces of sulphureted hydrogen, about 0.25 grain per 100 cu.ft. But some wells, especially those about Point Abino, contain much more, yielding in some instances as much as 27 grains per 100 cu.ft. This is more than should be allowed, as sulphureted hydrogen becomes a decided nuisance when it exceeds one or two grains per 100 cu.ft. The pro-

duct of the Niagara Peninsula Gas Company consumed in St. Catharines and Thorold contains no sulphureted hydrogen, and that of the Mutual Gas Company, of Port Colborne, Welland and Humberstone, only traces. Interviews with a number of medical men, resident in towns where natural gas has long been in use, failed to disclose any complaints as to its effects upon public health. When gas is burned, the products of combustion, so far as sulphur is concerned, are the same, no matter in what form the sulphur is present in the gas. The danger from escaping gas is infinitely greater from carbonic oxide than from sulphureted hydrogen, because though both are poisonous, there is always much more of the former present. Carbonic oxide often occurs to the extent of 20 per cent. while sulphureted hydrogen is seldom present in quantities over 0.002 per cent. The report concludes that, while it would be better if sulphureted hydrogen were totally absent, yet it cannot be believed, in face of the evidence obtained, that so minute a quantity of sulphureted hydrogen has any perceptible effect upon health.

Timbering in Swelling Ground.

BY CLAUDE T. RICE.

This character of ground is the most difficult kind the miner has to contend with. The swelling is due to the oxidation of certain minerals in the rock; generally these are lime-bearing. Frequently in dry ground the swelling ceases after a time, because of the formation of a protecting crust of oxidized rock which prevents further action. Swelling ground, however, is generally damp, and the swelling is due to the effect of the water upon the lime-bearing minerals. In wet swelling ground the action rarely ceases until it is drained by a deeper level. This is the only remedy which can cure the trouble.

Many methods of timbering have been tried in this kind of ground. In one instance (I believe in California) a wedge-shaped buttress-set as shown in plan, in Fig. 1, was tried. The buttress-set is lagged, the post being braced from the regulation drift sets. But generally the method used is the simple one of a protecting bridge-set, surrounding a regulation drift set and clearing it by 6 to 8 in. (Fig. 2). The drift set is blocked from the bridge-set opposite the ends of the posts and the cap. The bottoms of the bridge-posts are blocked against the bottoms of the drift-set posts, which are held apart by shoulders on the side, or else by a simple spreader placed between them. The lagging is placed against the bridge-set. As the ground swells, laggings are chopped out and the ground eased up. Often a bridge-set post or cap breaks and then it becomes rather a hard job to replace it with another. That is the drawback to this method. It is best adapted to hard swelling ground.

When the swelling ground is soft and clayey in nature the "sprag-set method" used on the Comstock is the best. This method has been employed for years on the Comstock and is highly praised. It consists as follows (Fig. 3): A regulation drift set is used. A number of sprag pins 5 to 7 in. long are made from blocks of 2-in. fir planks. These blocks are split into pieces, which are whittled into round, tapering pins, 2 in. diameter at the large end, 1 in. at the small end. The set is lagged, the lagging resting against the small ends of the pins, whose large ends butt up against the post. The slow, irresistible pressure of the swelling ground drives the small end of the pins through the lagging and the post is saved. The lagging is slowly pushed forward, the pin going clear through into the clay beyond.

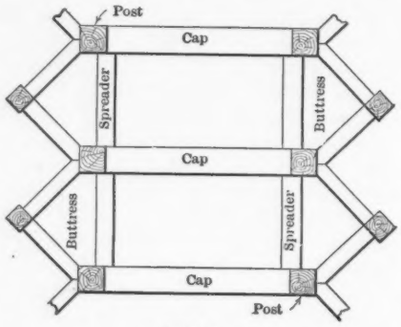


FIG. 1.

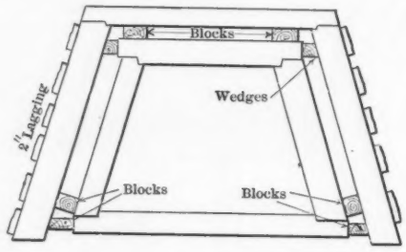


FIG. 2.

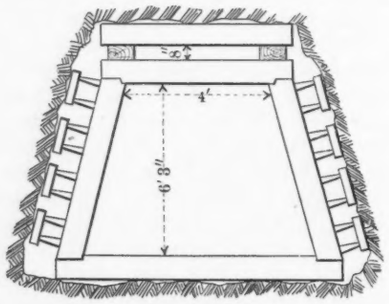


FIG. 3.

Finally the pins are knocked out and the set eased up; the laggings are put in position again with pins supporting them and the process repeated.

This same method can be used in supporting the roof lagging, but owing to the tendency of the pins to "jack-knife," owing to uneven settling, a bridge-cap is best used for supporting the roof.

Frequently only one side of a drift swells. In that case sprag pins against the lagging on that side protect a set more simply than can be done by means of a bridge-cap and bridge-post, or even by a bridge-post alone.

Ancient Egyptian Mining Tools.

BY J. J. BELL.

There has recently been placed in the museum of Victoria College, Toronto, a number of ancient mining tools brought from Egypt by C. T. Currelly, who has been engaged in investigating the turquoise mines of the Sinai peninsula. These mines are found in the Wadi Magarah (valley of the mines), and were opened as early as 4700 B. C. The turquoise was one of the earliest minerals worked, and was highly esteemed, both as a charm and on account of its beauty.

The Egyptian turquoise is found in a very soft ochreous sandstone, about 200 ft. up from the bottom of the valley, and was probably produced by great basaltic upheaval. The Egyptians worked it by driving straight shafts into the cliff and cutting out the stone with small copper chisels, or working it out by means of flakes of flint and heavy stone wedges. The sandstone was then powdered with stone hammers and the turquoise easily picked out of the sand. The Bedouins seem to have gone on working the mines, as some of them show little mark of copper tools of which the Bedouins were probably not possessed. The Egyptian turquoise differs from most others, being of a softer blue with no greenish tinge.

Mr. Currelly also examined some ancient copper mines in another part of the Sinai peninsula. The only ones which could be found were pits dug into the rock. The simplest form of blast furnace was employed, being situated on the edge of the hill where it could get the wind. One furnace of early type was a pit 3 ft. deep, built up for 3 ft. with 1-ft. aperture, then 5 ft. more, with another blast hole at right angles.

The copper chisels found in the turquoise mines have a cutting edge of about ¼ inch. The flints were used for scraping away the earth and stone.

Experiment has proved that different coals, even from the same locality, vary greatly in the matter of strength, and this fact makes it advisable to test the strength of the coal in every mine. Only by carefully doing this, and using the result obtained as a basis for the proper proportioning of the pillars, can a method of working be adopted that will allow the maximum amount of coal to be extracted and at same time eliminate, or at least lessen, the liability to squeeze.

Colliery Notes.

The flame caps on safety lamps burning alcohol are rendered more easily visible by the introduction of a mixture of copper nitrate and ethylene chloride into the alcohol. This considerably hightens the color of the caps.

The resistance losses due to transmitting an electric current over a conductor may be decreased by sending power over the line at high voltage. In this case alternating current must be employed so that the energy generated may be transformed at the power station to a current of high potential.

In diamond drilling it is not uncommon to have frequent breakages due to the vibrations and shocks to which the rods are subjected. When this occurs and a piece of broken rod drops to the bottom of the hole, it has been found that powerful magnets will often act successfully in dislodging and raising the broken rod.

Wooden rollers are often as economical in underground rope-haulage systems as those made of cast iron or steel. The advantage claimed for a wooden roller is that it is better for the rope to wear the roller than for the latter to wear the rope. In outside haulage steel rollers are best, owing to the action of climatic influences.

It is now stated that the diameter of the smallest pulley over which a rope works should be in proportion to the largest size of wire in the rope, and not in proportion to the size of the rope itself. From a number of tests, it would seem that the pulley should be about 700 times the diameter of the largest wire. Smaller pulleys crystallize the wire quickly.

Cleanliness and sanitary conditions in mines are most essential to health among miners. Ankylostomiasis is caused by parasite worms getting in the intestines, and comes from eating food with dirty hands, drinking contaminated water, or coming in contact with the excretions of an infected person. The growth of the worm is favored by a warm and moist atmosphere.

The thickness of metal for cast-iron tubbing to be used as a watertight lining in shafts must be increased with the diameter and depth of the shaft. One authority gives the following thicknesses: For a depth of 330 ft. a thickness of 1 in.; for 650 ft., 2 in.; for 980 ft., 3 in., and so on. As is well known, the resistance of a corrugated pipe exceeds that of a simple plain pipe, and likewise the resistance of shaft rings and tubbings to flexion strains may be increased by replacing the usual smooth wall with a corrugated form.

Compressed air differs from electricity, especially in the fact that electrical friction losses cannot be regained, while corresponding losses with compressed air may be eliminated. The moderate fall in pressure in the air due to friction augments the volume of the air and does not involve a loss of transmission. "If the air were at 80 lb. gage or 95 lb. absolute upon entering the pipe, and 70 lb. gage or 85 lb. absolute at the other end, there would be a loss of a little more than 10 per cent. in absolute pressure, but at the same time there would be an increase of volume of 11 per cent. to compensate for this loss of pressure, and the loss of available power would be less than 3 per cent."

One distinct advantage resulting from the use of machines in coal mining is due to the increased safety afforded the miner. This is especially true in a high seam (7 ft.), where the miner often attempts to get down the coal by using a heavy charge and shooting on the solid. Where such a hole is improperly loaded or wrongly placed, a blown-out or windy shot results, sometimes causing gas or dust explosions. If machine undercutting is practiced, the explosion has two free faces on which to exert its force instead of one, so the danger of missed shots is greatly lessened. It is a serious question whether it would not be best for all States to prohibit shooting coal from the solid.

In opening a coal mine, the engineer should run careful levels along the crop and plot a profile, so that the lowest or most advantageous point for entering the coal can be determined. When the seam dips into the hill, the drift should be commenced several feet below the outcrop, and driven on a slight up grade until the coal is reached. This prevents surface water from running in, and also allows the cars to run by gravity from a parting near the mine mouth to the tipple. If bore holes show the inward dip to the center of the basin to be more than 25 ft. difference in level, so that drainage cannot be effected by a siphon, then it is best to sink a shaft, provided the depth is not too great.

The thermal efficiency of a gas producer is the ratio of the heating value of the gas to that of the fuel from which the gas is made; of course the fuel burnt under the boiler for steam-raising purposes must be added to the coal used in the gas generator. Gas used for driving a gas engine is cooled after it is made, so it is evident that the thermal efficiency of the producer is the ratio of the heat in the cold gas to the heat of the fuel from which it is made. The manufacture of coal gas with bituminous and cannel coal gives 22 per cent. Water gas (using coke) gives an efficiency of 71 per cent. Gas is obtained from anthracite with an efficiency of 73 per cent. Mond gas efficiency varies from 67 to 84 per cent., while blast-furnace gas has an efficiency of about 50 per cent.

Explosives whose base is potassium nitrate are slow to act, and although they are most suitable for blasting coal, they are the most dangerous explosive to use in dry, dusty mines. The reason for this danger is due to the fact that the various ingredients which go to form this variety of blasting powder do not yield the amount of oxygen necessary for complete combustion, therefore a large proportion of the gaseous product consists of carbon monoxide which is inflammable at a temperature equal to the ignition point of the powder. If such substances as nitroglycerine and nitro-cotton, which are of a highly sensitive nature, are introduced into explosives of this class, the action is quickened, and when perfect detonation is obtained, the maximum degree of safety is brought about.

One important consideration which favors making the main haulage road a return airway is due to the fact that such an arrangement permits the hoisting shaft to be the upcast, which prevents the formation of ice and consequent delay in hoisting in the winter season. This scheme of course presupposes the use of a force fan, or the placing of double doors upon the main haulage road at the shaft bottom, which latter plan is undesirable. Before deciding on such a method, however, other important considerations deserve attention; first, if the mine is fiery, the return current is gassy and both men and animals should be kept off the return airway. Again, on the other hand, there are usually fewer doors on the return airway than on the intake, which is a condition favorable to haulage roads. The general argument advanced against haulage on the intake is that where this is done, the dust is carried into the working places, which should be avoided whenever possible.

The Aldrich Mining Company in Alabama has a system of continuous weighing and dumping that has proved very efficient. As now operated, the train of loaded cars is hauled to the dump, and stops for a moment with the motor on the tipple (the trolley wire running through it) and the first car on the weighing scale. As each car is weighed, the motor moves forward, bringing the car on the tipple where it is automatically caught and dumped. At the same time the next succeeding car is being weighed. One man, by means of a lever, can dump the cars and attend to the weighing while the train of cars is in slow motion, without stopping them at all. After the rotation of the tipple has been started, the remainder of its movement is automatic; it revolves completely, returning to its original position. At no time during the dumping of the entire trip are any of the cars disconnected, this being made possible by fastening the links which form the coupling to an eye-bolt acting as a swivel. This tipple will dump 7 cars per minute.

Metallics.

Antimonial lead may be made stronger, easier to roll and less corrodible by the addition of 0.1 per cent sodium.

Boiled linseed oil is used in ordinary paints on account of its being already partially oxidized and thus drying more quickly.

As the manganese-bronze of commerce is known to-day, and as it exists on the market, it represents the invention of Perceval Moses Parsons, of London, England.

Direct sunlight should never be allowed to strike balances. The best light for a balance room is diffused light coming from behind the operator as he sits at the table.

Metals which are cast usually show their natural defects in casting, but metals which undergo mechanical treatment, as rolling, forging, etc., may have similar defects entirely removed or at least remedied by the process.

The white lead business is affected to a surprising extent by the state of the weather during the spring months of the year. It is at this season that most of the house painting is done, so that rainy weather will conduce a greatly lessened demand for pigment.

It is reported that some rich diamondiferous ground is being opened up near Christiana on the Vaal river, South Africa. It is not proposed to work the river bed, but to confine dredging to the banks of the river, which are really its ancient bed.

Ferro-manganese is used in the manufacture of steel to promote soundness. It consists of about 80 per cent. of manganese, about 14 per cent. of iron, and about 6 per cent. of carbon. Other ingredients, such as sulphur, silicon and phosphorus, are present in small quantities.

The size of broken or crushed stone is designated by different names, such as "2½-in. ring," "3-in. stone," "1-in. product," etc. The first designation is probably more accurate, meaning all the stone coming from a breaker which will pass through a ring of the designated size.

The steam shovel is responsible for mining almost inconceivable tonnages of ore. In the Lake Superior iron deposits a single shovel has loaded 4140 tons from the stock pile in 335 min. Three shovels have loaded 18,000 tons from the natural deposit in 10 hours, and many other equally remarkable records have been made.

Iodine is extracted from seaweed by dissolving the ash in fresh water, and evaporating the solution. The concentrated solution contains, beside iodine compounds, the chlorides of potassium, sodium and magnesium and the sulphate of calcium. Sulphuric acid and manganese di-oxide are added and the iodine is distilled.

The choice of material for crucibles is determined by the nature of the substance to be heated and the temperature to be reached. Graphite crucibles are used when the substance to be heated is not affected by carbon. Magnesia crucibles are frequently used for fusing metals and preparing alloys, when the temperature to be reached does not exceed 1650 degrees centigrade.

The sources of arsenic in this country are, thus far, only four in number: Certain of the copper ores at Anaconda, Montana; certain others in the Monte Cristo mountains of Washington; the realgar deposits of Mineral creek, Washington; and the arsenopyrite bodies at Rewald, Virginia. The production from these sources in 1905 amounted to 1,545,400 lb. of arsenious acid.

The high-grade manganese ores from Virginia are used mainly by the chemical and glass manufacturers and brick-makers and those from California and elsewhere in chlorination works; the low-grade iron-manganese ores are used for pig iron and spiegeleisen; and the franklinite residue is smelted into spiegeleisen at the New Jersey Zinc Company's Palmerton, Penn., works, where also zinc oxide is made.

Babbitt metal, made after the specifications of the German railroads, contains 83.3 tin, 11.1 antimony and 5.6 per cent copper as compared with the composition of 88.9 tin, 7.4 antimony, and 3.7 per cent. copper adopted by many railroads in the United States. The German metal is the harder and for many purposes is too hard; consumers in the United States often buy hard metal and then soften it with tin.

The most successful development of chrysotile, or serpentine, asbestos in this country is the one at the bottom of the Grand Cañon of the Colorado, operated by the Hance Asbestos Company. Practically all other asbestos mined in this country is of the amphibole variety, which is inferior, for many uses, to chrysotile. The Canadian output, on the other hand, is almost exclusively of the serpentinous variety.

The production of lead pigments in the United States in 1905 was as follows: Red lead, 16,269 short tons; white lead, 122,398 short tons; litharge, 12,643 short tons; orange mineral, 1000 short tons; sublimed white lead, 6977 short tons and zinc-lead pigment, 7200 short tons. In every department of this industry, the year 1905 saw a substantial improvement in output over the previous year.

Coal tar is used with great success in coating cast-iron pipe; this coating is thinned occasionally with linseed oil, when continued use makes the bath too viscous. The success of coal tar on cast-iron pipe is due to the fact that the iron is dipped into a warm bath and is at a black heat; these conditions drive off all the volatile matter and the tar becomes a lacquer. Pipe so coated will appear as fresh as new after being buried in the soil for years.

The United States imports manganese in ore, and in the iron alloys, ferromanganese and spiegeleisen. Manganese ore and oxide, containing not less than 50 per cent. manganese, and not over 10 per cent. iron, enters free of duty; ferromanganese and spiegeleisen each pays a duty of $4 per ton. In recent years Brazil has supplied over half the entire imports of manganese ore, the rest being about equally divided among Cuba, the British East Indies, and Russia.

In considering the capacity of stamps dropping on different sizes of ore, the hight and number of drops per minute, and the depth of discharge, must be considered. It is pointed out that while with ore of 2½ in. a drop of 9 in. would give the highest efficiency, a drop of 5 in. and 6 in. respectively would be ample for ¼ in. and ½ in. With a drop of 9 in., the limit of speed would be 96 drops per minute, while with 5 in. and 6 in. a speed of 108 and 112 might safely be obtained. A fair ratio between size of ore fed and depth of discharge is that the latter should be twice the former, or in other words, for 2½-in. ore use a discharge of 5 in.; for 2-in. ore, a discharge of 4 in., etc.

True manganese ores, that is, those containing around 50 per cent. manganese, are mined in only small quantities in the United States. Iron ores, however, carrying useful proportions of manganese, are mined in important quantities. The New Jersey Zinc Company also obtains a considerable amount of manganiferous material as a residue from the franklinite ore which it treats primarily for the recovery of zinc oxide. In Leadville, Colo., large quantities of iron-silver ore, carrying manganese, but not enough silver to be workable for its precious metal, are mined and sent to the silver-lead smelters, who use it for a flux. This ore occasionally carries enough manganese to be adapted for making spiegeleisen and some of it is so employed.

Absolutely pure silver is produced in the United States mint by electrolysis of fine silver, using an electrolyte of silver nitrate with 1 per cent. free nitric acid. From the bar of silver 0.999 electrolytic action throws the silver down in the form of crystals, which are washed. In melting these crystals the flux used is three parts fused borax and one part pure niter. The bar's second melting is made without a flux to remove the oxygen introduced by the niter of the previous flux. When the silver is thus melted it is stirred with a piece of dry wood as long as the action due to the presence of oxygen continues, then poured into a chalk-lined mold, the bar cleaned with a brush and dilute sulphuric acid, and after being rolled out is ready for use.

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Reports of Mine Examinations.

The preparation of reports on mining property has been the subject of many papers in the technical press and the transactions of the engineering societies; moreover, there are several books which treat of it to more or less extent, and some which outline in a skeleton form the various heads which should be covered in a report of this kind. Nevertheless, this important literature appears to have received no general consideration, for there is comparatively little improvement in the character of the mining reports which are submitted. The large exploration companies receive regularly a huge number of these documents, accompanying the propositions of vendors, promoters and owners seeking financial assistance. The majority of them are distinctly bad. They are ill expressed, rambling in form, prolix in unimportant details and deficient in their statement of the important, lacking in precision, and, because of their failure to meet the inquiries which the engineers of the other party naturally ask, defeat utterly their own purpose. Occasionally there is received a clear-cut, concise report, which shows *prima facie* evidence that the facts have been accurately observed and clearly stated, enabling an immediate consideration of the reliability of the conclusions to be given, and the prompt consummation of arrangements for an independent verification of the facts. It is undoubtedly true that the bad reports generally accompany the propositions of bad ventures, and, moreover, that the good ventures eventually become winnowed out in some way; but there are many cases of good properties condemned to careless attention and the ignominy of being hawked about in the market because of the useless engineering reports with which they are presented.

The reason for the existence of these useless reports is manifold. The vendor is partially responsible; the engineer is partially responsible. The progress of a certain type of negotiation is often substantially as follows: The vendor addresses a brief business-like letter to the possible purchaser, which draws forth an expression of interest and an inquiry as to whether an engineering report on the property can be submitted. The vendor replies that it can and forwards what he calls, and probably believes to be, such a report, although it may be of a character which in his own business, say the manufacture of shoes, would not receive ten minutes of his consideration, because of its obvious failure to cover the features of the project which he knows to be essential. He ignores that he is presenting the scheme to men who make mining their business, and either through ignorance that mining is a business or through a false idea of economy, fails to employ a competent engineer to advise him and properly present his interests. The result is that he tenders a rambling, inconsequent document by some local irresponsible, obtained at a cost of a few dollars, as an engineering report. The prospects for doing business under such auspices are not good; yet we have known more than one really meritorious property to be thus first presented.

In many cases, however, reports are submitted by engineers competent to give a useful description and express a judgment worthy of consideration, which can be brought out by a personal cross-examination, but are not evident in the written statement. This also betrays a failure to appreciate the economics of mining; especially the considerations which determine the value of a mining property. It is quite insufficient to describe the situation of the property, the status of its title, the nature of its surface equipment, the extent of its developments, and, after a recital of its past record, sum up the future prospects in the indefinite generalization that there is still a lot of ore exposed and the orebodies may be expected to extend much beyond existing openings. All of this information, while well enough so far as it goes, if presented clearly and concisely, falls far short of answering the fundamental questions which determine the value of the property, viz.: How much will it pay? How long will it pay? and, How much will it cost?

These questions can seldom be answered absolutely; the fact that they cannot be is that which makes mining as a business so attractive, but the more nearly the probable results can be forecast, the sounder is the venture. Now, the scientific approximation of the future of a mine demands consideration of many factors. First and foremost, there is required a study of the geology of the ore deposit—a branch of science which has been greatly developed during recent years. To cite only one example of how this enters into

practice, it may be remarked that thousands of dollars expended in fruitless prospecting 20 years ago would have been saved if there had then been the knowledge of secondary enrichment that there is today. Next comes the matter of the tonnage and assay of the ore developed, and the probabilities of the ore partially developed and expectant. Of great importance are the conditions governing the extraction of the ore and the cost of mining. Finally, the question of the treatment of the ore is in no way inferior to any of the others.

In the highest type of mining report all of these subjects are adequately treated and the probabilities are summed up in four figures, as for example: The A B C mine, for a development expenditure of $2,000,000, can produce 30,000,000 lb. of copper per annum for at least 10 years, at a cost of 8c. per lb. This is the essence of the whole thing, and is all the report that many financiers will read; but in order to arrive at those figures all details must have been carefully examined, analyzed and weighed, and will appear in the full text of the report for study by the critical. An excellent example of what the thorough, scientific mining report is, and ought to be, is afforded by the admirable report of J. Parke Channing on the property of the Nevada Consolidated Mining Company in 1905. Many reports by other well known mining engineers would serve as models which the younger men of the profession might profitably study. The prime object of such reports is to reduce to figures and sum up in a precise and concise manner the information which the capitalist, investor or purchaser needs to know. Everyone who is familiar with the class of literature which we are discussing knows how different is the ordinary report.

It is to be recognized that the proper presentation of all the subjects previously mentioned requires in most cases expert knowledge of a high order, generally of more than one man, and in the case of a large mine a thorough report is a costly kind of engineering service. It is not to be expected that such will be employed indiscriminately. A million-dollar mine may justify a twenty-thousand-dollar engineering service which would be absurd in the case of a twenty-thousand-dollar mine. Least of all is it to be expected that the vendor should undertake the service which the purchaser ought to, and would naturally want to, incur. But it is to be urged that all reports, whether for seller or buyer, or by engineers of superior or inferior capacity, should be formulated on the lines of communicating the practically needful information in so far as within the power of the observer. It is to be expected also that the principal facts be accurately observed and clearly stated. A simple report of the actual facts will always command vastly more respect than a rambling discussion of generalities and unsupported opinions; but it is too often the case that a pretentious report cannot be relied upon for the most rudimentary facts, which can be determined by a clear-eyed, honest "scout" of only moderate experience.

Pig Iron in 1906.

The actual production of pig iron in the United States in the first half of 1906 has been reported by the American Iron and Steel Association, which has returns from every blast furnace in the country. The total for the half-year was 12,602,901 long tons, which is less than the predictions made in the early months of the year. Nevertheless it is an important increase, being a gain of 1,439,726 tons, or 12.9 per cent., over the first half of 1905; and of 773,696 tons, or 6.5 per cent., over the second half of last year. That the increase was not greater is due to the fact that the gain in furnace capacity was in some degree offset by the number of furnaces which had to be blown out for repairs after long campaigns. As it is, the make of pig iron for the half year was greater than that for any entire year prior to 1899.

The classification of the iron made was as follows, comparison being made with the first half of 1905:

	1905.		1906.	
	Tons.	Per Ct.	Tons.	Per Ct.
Foundry & forge..	2,911,883	26.1	2,889 592	22.9
Bessemer....	5,985.148	53.6	6,899,066	54.8
Basic.....	1,966,592	17.6	2,449,275	19.4
Charcoal....	170,512	1.5	204,135	1.6
Spiegel & ferro....	129,040	1.2	160,833	1.3
Total...	11,163,175	100.0	12,602,901	100 0

The gain was wholly in the steel-making iron, bessemer showing an increase of 913,918 tons, or 15.3 per cent.; basic of 482,683 tons, or 24.5 per cent.; spiegeleisen and ferromanganese, 31,793 tons, or 24.6 per cent. Charcoal iron also showed a gain—33,793 tons, or 19.8 per cent.; but there was a decrease of 22,291 tons, or 0.8 per cent., in foundry and forge irons. These results emphasize the continued increase in the use of steel, and especially the steady advance in the employment of the basic process.

The chief gain was in the Central West—the Pittsburg district and the Mahoning and Shenango valleys—and in New York; the latter being due to the operation of the new furnaces of the Lackawanna Steel Company at Buffalo. The South barely held its own, and in fact made less iron than in the second half of 1905, though a little more than in the first half.

For the half-year, 92.3 per cent of the iron produced was made with coke as fuel. This would be increased to over 95 per cent., if allowance is made for the coke used by the anthracite furnaces, nearly all of which mix some coke with their coal. The total number of furnaces in blast during the half-year was 323, and the average 318, showing an average of 39,632 tons of pig-iron made per active furnace.

An Invitation to Fraud.

We have frequently referred to the fraudulent promoter and the seller of low-priced mining stocks, whose operations in the East have done so much to discredit mining investments in public estimation. That these people are still at work is, unfortunately, true; and how they find assistance is shown in a circular which has been handed us by a valued correspondent. We will not advertise the person who issued the circular by giving his name, which sounds very much like an assumed one; but we reprint below the type-written circular letter, exactly as it reads:

"Dear Sir—Do you want beautiful, showy, large gold in quartz, silver, copper, galena, and other rare minerals? We can make you up a fine collection, at a reasonable price. *It will help you a great deal, to sell your mining stock.* It may be very true, that you have a rich mine, and your ore, in analizing it, shows a high percentage of ore, but most of the capitalists do not understand the ore, only experts understand your rich ore. So we make the following suggestions.

"Show your stock buyers, something showy, and fine, and you will have no trouble in selling your stock, and increase your business, successfully. Throughout our experience, we have fitted up several mining concerns. Through a fine exhibitions of rich ore, they raised a large capital, and the result was that they doubled their out-put, because they increased their working capital. So we invite you to

our place of business, and we will show you some fine specimens."

There could hardly be a plainer invitation to fraud. Our correspondent thinks that the letter is certainly "the limit," and we quite agree with him. The writer evidently knows something of the devious ways of fraudulent stock selling. The only mystery is how he came to be ignorant, or careless, enough to send a copy of his letter to a mining engineer of high standing. Perhaps his previous experience with "mining concerns" that have "raised a large capital" has led him to believe that all men are as dishonest as himself.

The Silver Market.

The appearance of the United States Government as a buyer of silver in the open market, after an absence of 13 years, is not likely to cause any disturbance. The quantity required is not large—100,000 oz. weekly for the present—and is not likely to increase, as the purchases are only intended to cover the current requirements of the Mint for subsidiary coinage. Since the repeal of the Sherman law in 1893, these requirements have been met from the silver which was brought in accordance with that law. The accumulation is now exhausted. As was to be expected in a time of great prosperity and business activity, the requirements for subsidiary coins for circulation have been large, and the Mint needs bullion. The quantity, however, is too small to be of importance in comparison with the demand for the Far East, which is the regulating factor in the silver market. That demand has been unusually large this year. India has had a prosperous season and money is abundant there; the results being apparent in buying of silver. The amount exported to that country from London in the first half of this year was, approximately, 75,988,000 oz.—more than twice the quantity taken in the first half of 1905; and about thirty times the probable requirements of our mint for half a year. Still, the latter are likely to be an element in steadying the market and maintaining prices.

The Steel Corporation.

The tract of land purchased by the United States Steel Corporation for the new industrial city of Gary, Ind., measures 2793 acres and cost $1,926,065. On this is to be erected what will eventually be the largest steel plant of the United States and a complete city dependent upon it, making an American Essen. The designing and building of such a plant, to be laid out on the broadest lines, to embody the latest improved practice in all particulars, and presumably to reproduce the ideal in modern metallurgical construction, is an opportunity which falls to few engineers, and we hope to see in this new plant and city an accomplishment that will rank with the great public works of the world.

It is gratifying to learn that this new plant is to be paid for out of the surplus of the company, without the issue of any more bonds for the purpose. This great corporation is undoubtedly bonded and capitalized already at a sufficiently large figure. It gained in public esteem by the suspension of dividends on the common stock and the accumulation of a surplus commensurate with the needs of a giant concern which has so immense a field of activity. The employment of a part of this surplus in a way which will increase the earning capacity of the company is a policy that will further add to the public confidence in what is practically a national industrial enterprise.

The Atlantic Mine.

The temporary abandonment of the old Atlantic mine will cause general regret, not merely among those who are directly interested in the property, but also among the mining profession at large, which has for many years regarded this property as the exemplification of what good engineering and economical methods could do in the mining of very low-grade ore. Among the mines of Lake Superior, the Atlantic has long held the best record in this respect. The recent "earthquake," or settling of the hanging wall which interrupted operations, proved more serious than was originally suspected, and the management finally decided that its resources could be more profitably expended in exploring for the Baltic lode in the large undeveloped territory of the company than in reopening the old mine. However, it is not planned to abandon the latter forever, and some day it may be reopened by a new shaft off the lode, or otherwise. It it to be hoped that the prospecting for the Baltic lode will soon result successfully, so that not only the stockholders may receive an income from this source, but also that the management may feel free to give attention again to the historic old mine.

The Sault Ste. Marie Canals.

The freight traffic through the Sault Ste. Marie canals, between Lake Superior and Lake Huron, had already reached by Aug. 1 the great total of 22,610,551 tons; an average of approximately 215,000 tons a day. The great importance of this channel to the mineral industries is shown by the fact that 16,018,806 tons, or 70.8 per cent. of the total, were iron ore; while coal was 3,570,362 tons, or 15.8 per cent. The mineral freights also included 52,657 tons of lake copper, this being an increase of 6922 tons, or 15.1 per cent. over last year. The raw material for nearly three-quarters of our great iron and steel output passes through the locks at the Sault.

The Gayley Process in Great Britain.

It is interesting to note that Guest, Keen & Nettlefolds are preparing to adopt, at the Dowlais works, the Gayley process for the drying of the air for blast furnaces. What is said to be the largest refrigerating plant in the world is now being built for this new installation, which is expected to be ready for operation next spring. Although the enormous advantage offered by the Gayley process is now generally recognized it has not yet found wide application, not even in the United States, and consequently this first foreign installation is an event which is particularly worthy of mention.

Transvaal Gold.

The Transvaal gold production in July did not quite reach the half million ounces of fine gold which some operators promised. There was a close approach, however, the actual output having been 491,793 oz., or $10,165,361. This is, of course, another new record in monthly production; which looks as if the supply of labor was better than some reports would indicate. The total for the seven months to the end of July was $65,074,534. This makes it reasonably certain that the Transvaal will reach a total not far below $120,000,000 for the current year.

THE PRODUCTION of gypsum in the United States in 1905 amounted to 1,043,202 short tons, valued, at the quarries, at $821,967. Michigan is the largest producer.

The Lake Superior Mining Institute.

SPECIAL CORRESPONDENCE.

About 250 members of the Lake Superior Mining Institute gathered at the Douglas Hotel, Houghton, on Wednesday morning, Aug. 8, for its twelfth annual meeting. On arrival, each member received a full program of the sessions, together with abundant maps, both of the Michigan copper region, and of the Houghton section in particular, and a brief, but complete description of the district and its mines, by Horace J. Stevens. The abundance of this reading matter added much to a satisfactory understanding of the situation by those not intimately acquainted with Lake copper mining. In the five years since the Institute has met there, the copper district has expanded wonderfully, and has changed materially in character. While the district in 1901 produced 155,604,000 lb. of copper, it is now hoisting rock for an annual production of about 230,000,000 lb. This is due, not by any means to a higher grade rock, for there has been a diminution of copper content in some of the larger mines, especially in the largest shipper, but to the tremendous tonnage now handled. Five years ago the Institute visited the works of the Baltic, Trimountain and Champion mines, south of Houghton. These were then in initial stages, Trimountain being a mere exploration. Today the group is second in production only to Calumet & Hecla. There has been a similar development, though in lesser extent, on the Kearsarge lode further north. On the extreme end of Keweenaw point, then a wilderness, and so slightly regarded that no work was even in consideration, there are now many drills, several shafts in progress, and vast ownerships of mineral tracts. Then the Michigan Smelting Company was not in existence; today it has an annual capacity for 60,000,000 lb. of refined copper, and is one of the most modern metallurgical works of the world, embodying devices for saving labor and excellence of operation not excelled anywhere. Then the Michigan College of Mines was in what might be termed a formative state, though it had done much excellent work, and was far advanced among the schools of the country. It has grown greatly since then, both in its equipment and in the character and scope of the education given.

On Wednesday, after receiving their appointments, members of the Institute took a special train for Calumet, where the afternoon was passed, mostly about No. 5 Tamarack, Red Jacket and No. 4 Calumet. The former was interesting on account of the hoisting plant, a great four-cylinder Nordberg of tremendous power, lifting 6-ton skiploads of copper rock. The hoisting plant is in duplicate, two 6500-h.p. engines, with conical drums 16 to 24 ft. diameter. This shaft is 5080 ft. deep, vertical, and is one of the most interesting ever sunk. It has been fully described in previous proceedings of the Institute. Red Jacket shaft is 4900 ft. deep, and its surface equipment is remarkable. Close to these two is another one of the three deepest shafts in existence, No. 3 Tamarack, bottomed at 5200 ft. It was not visited. The party took in the Superior power house of the Calumet & Hecla Company, and inspected with much interest the beautifully finished engines there, having a combined horse-power of 15,000. None of these mines was entered.

On the next morning the South Range region was inspected, the party beginning at Redridge, where is the Baltic mill and the great gravity steel dam for the various associated companies there. At the last session of the Institute held in the copper country this dam was in initial stage of construction, and of a type that was then considered somewhat of an innovation. Champion and Baltic surface plants were examined. On this day, too, the Calumet & Hecla stamp mills at Lake Linden were visited by some of the members, where preparations for a complete electrical equipment were to be seen. Others went to the Globe shaft of the Copper Range, south side, where 250 ft. of soft overburden was cut in the shaft. The Calumet stamp-mill is now run by motors from one large generator, placed in a new power-house where there is already installed 10,000-h.p. equipment in four generators. Transmission lines and machinery at the mine are not yet ready, so only a small amount of power is transmitted there as yet. In this connection it is interesting to state that the question of electric hoists is being taken up very energetically, and that it is probble that in the comparatively near future there may be installed here the first deep-mine of hoist of large capacity driven electrically.

Northerly mines, Mohawk, Ahmeek, Allouez and others were inspected, and at Wolverine some of the party went underground for a brief stay. On the entire visit of the Institute not much time was spent underground, for most of the mines were closed to visitors; nor at mills, for it was considered by the local committee that an inspection of one typical mill, such as Baltic, was sufficient.

At the annual business session the following were elected for the coming year: President, Thos. F. Cole, of Duluth; vice-presidents, D. T. Morgan, of Republic; D. E. Sutherland, of Ironwood, and N. W. Haire, of Houghton; managers, J. W. Amberg, of Chicago, Pent Mitchell, of Duluth, J C. Greenway, of Coleraine, Minn.; secretary, A. J. Yungbluth, of Ishpeming; treasurer, E. W. Hopkins, of Commonwealth, Wis. Messrs. Yungbluth and Hopkins were given an especial vote of thanks for their considerable and well conducted services for years past. The financial statement showed receipts for the year of $2395; expenditures $1638; cash on hand at the close of the year, $4396. During this session 57 applicants were admitted to membership, and the total membership of the Institute is now 465, making it the largest local association of mine operators, managers and owners in the country. The attendance was, perhaps, more general than has been the case at any session since that on the Mesabi range in 1902.

Too much was, perhaps, expected from this meeting, for it is quite evident that little more could have been seen in the limited time available, and the large area and many diversified plants to be inspected. The equipment of the College of Mines, which was seen by but few of the visitors, was one of the most interesting features of the district, and the power plant of the Victoria mine, at Rockland, which was seen by none, is something so unique and startling that a visit there would have been of the greatest interest, no matter how long a time had been consumed by the trip. But it did not seem possible for the committee to include a journey to Rockland in its itinerary, and give due regard to other sections whose importance, so far as copper production is concerned, is overwhelmingly greater.

Five Years of Progress in the Lake Superior Copper Country.*

BY J. F. JACKSON.

The last meeting of the institute in the copper country was held at Houghton in March, 1901. At that time the exploration and development of new properties, and the increase in production of old ones, due to the better demand for copper, had gained considerable impetus. Of the new mines floated during the boom, a good percentage have developed into established paying properties. The annual production of copper has grown from 139,000,000 to 240,000,000,000 pounds.

Capital is seeking investment in Keweenaw county, with the result that a new railroad is being constructed from Calumet, and extensive operations are being produced by the Keweenaw Copper Company, and the Calumet & Hecla interests. The Mohawk has developed into a dividend payer with an enviable record of low mining costs. Adjoining the Mohawk is the Ahmeek, noted as the first to use concrete stringers for skip tracks. Next is the Allouez, which made the remarkable record of sinking a large shaft 1400 ft. at the rate of 100 ft. per month. This shaft is sunk at 80 deg. to its junction with the lode, at which point it turns and follows the lode at an inclination of 40 deg. This is the only example of the kind in the county.

*Abstract of a paper read at the meeting of the Lake Superior Mining Institute, August, 1906.

At the Kearsarge lode of the Osceola, improved skips have been installed, and old timbering is being replaced by rock fills and concrete stringers on the footwall. The Wolverine has recently made a record by maintaining its regular production for a period of three months from one shaft, while its rockhouse at No. 3 shaft, which has burned down, was being replaced by a steel one. The Wolverine is credited with producing a pound of copper cheaper than any other mine at the Lake. The Centennial has two shafts on the Kearsarge lode. They are close together at the surface, but diverge as they follow the lode.

The Calumet & Hecla is developing the Kearsarge lode extensively at several points. All new shafts have been lined with concrete from the surface to the ledge. From an engineering point of view, probably the most important departure from previous practice has been the installation of a large central electrical power plant at Lake Linden. Ten thousand horsepower has already been provided. At the Tamarack, a fire which broke out several months ago and probably continues to smoulder, has so filled the mine with gas as to entirely cut off production from No. 1 and No. 2 shafts. Tamarack No. 3 now has the distinction of being the deepest vertical shaft in the world. It has reached a depth of 5200 ft., and sinking is still under way. Adjoining the old Osceola, is the Tecumseh, which is sinking in very promising ground on the Kearsarge lode. The Rhode Island is doing diamond drilling in search of the same popular formation. The Franklin is doing extensive exploration, besides making a regular and increasing product. The work of rejuvenating the old Hancock mine is just being undertaken.

The Mesnard shaft of the Quincy has the first reinforced concrete stack to be built in the copper country. The Atlantic is temporarily out of business, due to the caving in of the ground into old stopes near the surface. On the south side, the Lake, the Isle Royale and Superior are doing extensive exploration. At the Baltic, which with the Trimountain and Champion now constitutes the mining division of the Copper Range Consolidated, the vein stands at about 70 deg. and the filling system is used, so that the hanging wall can give no trouble. The Baltic has just put into service a new rockhouse at No. 2 shaft, having a system of bins designed to handle rock to crushers without shoveling. The Champion mine's new air compressor, with quadruple steam cylinders, holds the world's record for economy in steam consumption.

An interesting example of shaft sinking is under way on the Globe lands. This shaft, 16x24 ft., was sunk as a drop shaft a distance of 140 ft. A second shaft was then started inside the large one, having a shoe or shield constructed of steel sheet-piling about 8 ft. long. In the case of a "boil" of sand or a heavy flow of water from any particular point in the circumference of the shoe, one or more of the sections of the sheet-piling drop down and cuts off the flow. The upper end of the sheet-piling forms an apron within which solid timbering is done. The shaft has now reached a depth of about 180 ft. in water-bearing sand and gravel. There is every promise of successfully reaching the ledge, which lies at a probable depth of 40 ft. below the present bottom of the shaft.

The Challenge, King Philip, Wyandot and Lake are under exploration. The Winona is nearing production and has under construction a new rockhouse with improved method of screening and crushing rock, which will practically eliminate all shovcling. Operations on a constantly enlarged scale are being conducted by the Mass and the Adventure mines. Probably the most notable achievement in an engineering way within the last few years has been the successful installation of the great hydraulic air-compressor plant at the Victoria mine, as a result of which all machinery of stamp mill, hoisting plants, shops and drills is now run by compressed air.

A number of stamp mills have been built of steel during the last five years. At several of them the Nordberg compound head has been installed. The increased use of crushing rolls, re-grinding mills and oscillating tables is noted. The Champion mill has in operation in an experimental way a so-called graded crushing system wherein the crushing of the rock is accomplished by means of gyratory crushers, rolls, grinding machinery, etc., without the use of steam stamps. Its general purpose is to accomplish the removal of the released particles of copper at each stage of the reduction in size of the copper rock and consequently with the least possible abrasion of the metal. A general reduction in the cost of milling a ton of rock has been made and a better saving of values effected in practically every mill in the district.

In smelting, the important event has been the completion of the Michigan smelter, which is well constructed and is supplied with modern metallurgical and mechanical equipment for economical operation. The Calumet & Hecla smelter also has extensive improvements under way, including a large and well equipped blast-furnace building.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

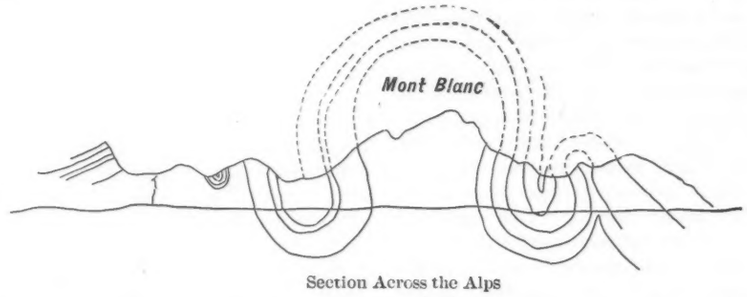
Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Sudbury Nickel Region.

Sir—Referring to the article by Phillips Thompson, in the JOURNAL of July 7, in praise of A. P. Coleman's report on the Sudbury nickel region, I wish to call attention to a few facts which have been overlooked or suppressed in order to make reported facts fit a theory. The geological section accompanying the article shows only one eruptive band, while, as a matter of fact, there are 16 known in the space of two miles as shown on the section in Dennison township.

In the interests of truth it is necessary to have both sides of a question presented. The accompanying section of the folding in the Alps will illustrate Sir John Lubbock's explanation of mountain formation



Section Across the Alps

and the intrusive massives. "The plutonic rocks have, moreover, produced no effect on the strata which now rest on them. If, however, they had been intruded in a molten condition, they must have modified the rocks for some distance around. It is evident, therefore, that the igneous rocks had cooled down before the overlying strata were deposited."[1]

"In attempting to understand the structure of the Central Massives the first problem which confronts us is the true nature of the crystalline rocks. They were long regarded as intrusive plutonic rocks, which had been forced up, and were therefore younger than the secondary strata. As already mentioned, however, they are now regarded as essentially passive, not active; not as having forced up the secondary rocks, but as having been forced up with them by the same lateral pressure; as being of extreme antiquity, and indeed in the opinion of some geologists as a part of the original crust of the earth."[2]

The cases are similar with the added condition that glaciation has been con-

[1]Page 25, "The Scenery of Switzerland." Sir John Lubbock.

[2]Page 232, *Op. Cit.*

tinental in Ontario and a complete cross section of the folded Huronian sedimentaries and the unfolded greenstone has been left as a record of the cycle of geological and climatic changes.

All the rocks are much crushed and faulted, while the orebodies are not, showing that they are younger than the folding. The sedimentaries are present and stand on both sides of the greenstone cores of the anticlinals, showing plainly that they were originally lying on top of the greenstone, and further that the greenstone is the basement rock of the series instead of being an overflow as claimed.

The orebodies of the Sudbury district are of hydrothermal replacement origin and have a very respectable family history, but they will have to stand for a long time the tales of how they came into existence in a perfectly impossible way.

HIRAM W. HIXON.

Victoria Mines, Ont., July 15, 1906.

Mining in Brazil.

Sir—My attention has recently been called to a report by the American consul general at Rio Janerio, James E. Anderson, and as many of the statements contained therin seem to conflict with others made by myself in the July number of the *Mining Magazine,* I hasten to give them a comparison through your columns.

Mr. Anderson should hardly have committed himself to such a wide statement as, "It is a notable fact that not a single mining company operating in the gold and diamond fields has ever paid a dividend."

The Bureau of American Republics issues a brochure of about 200 pages relating certain information concerning Brazil. I may be permitted to quote some lines pertinent to the subject now under notice. On page 81 we read, "These industries (agricultural, etc.), not only give life to undeveloped districts, but renewed prosperity to gold mining, which is entering upon a phase of extraordinary activity." Pages 116 and 117 give the list of several valuable gold mines in one Province alone, Minas Geraes, from which over 100,000 kg. of the precious metal have been taken; the records of other shipping mines are open to any inquirer.

Early in her history, Brazil had no rival in gold production; for a century and a half the annual yield averaged $5,000,000 annually. Up to 35 years ago this country furnished 90 per cent. of the diamonds to the world; fortunes were made and, when the South African stones flooded the market, the wealthy Brazilians turned their attention to growing coffee, and the yearly output of native diamonds dwindled away, reaching the lowest point 10 years ago, when only about 3000 carats found their way to the jewelers of Paris. Since then, local conditions have improved, mining is being revived under experienced supervision, and about 100,000 carats were exported last year.

In my recent magazine article I state, "All the local conditions would seem to favor successful mining (for gold and diamonds) on a large scale by dredging; the gold mines are today practically abandoned, but the idea that the deposits are worked out is erroneous. The hill country which carries the diamond and gold formations has been scoured during the rainy seasons for countless ages, carrying the precious particles down into adjacent rivers. The cost of mining diamonds is not one-tenth of what it amounts to in South Africa."

I know nothing about the "stock-selling schemes" which are mentioned. But I know that there are many legitimate opportunities for both diamond and gold mining in Brazil, if the operations are carried out upon modern lines with American dredging machinery.

The only statement, in the published extracts from this curious report, with which I can agree is the one regarding the present incompleteness of the mining laws; but these are gradually being amended. Most of the acreage is held by private ownership, and satisfactory agreements can always be made with the proprietors; the Government only grants mining concessions under special conditions, which are clearly expressed, and refer mainly to the verification and attestation of the titles; every mining corporation and private investor can and should see the exact legal conditions surrounding these grants of leases.

The estimated production of Brazilian diamonds up to date is over 12,000,000 carats, distributed as follows: from Diamantina, 5,000,500 carats; other mines in Minas Geraes, 1,500,000; Bahia (La Chapada), 2,500,000; stealings, etc., estimated, 2,500,000 carats. The most important mines are in the State of Minas, the Grao-Mogol deposits, those of Bagagem and Abaete; with smaller workings at the river Jequitinhonha and those of Guinda, Boa Vista, Dattas, Barro, Sopa, Caldeirao, rio Pardo Pequeno, Curralinho and do Inferno. Among the principal gold-mining companies will be found the Passagem and Raposas, Pary, Morro de Santa Anna, Catta Branca, Morro Velho and the Gongo Soco.

The Brazilian Government is anxious to encourage American enterprise, and no investor need be afaid of the safety of his venture, provided that he has satisfied himself in the ordinary manner as to the location of any offered mines and the legality of the documents vouching for their ownership.

A. BRANDENBURG.

New York, Aug. 1, 1906.

Arsenic bronze used in railway brasses consists of copper, 80 parts; tin, 10 parts; lead, 10 parts. The arsenic added equals 8 per cent.

New Publications.

"Western Australia. Report of the Department of Mines for the Year 1905." Pp. 201. 8x13 in.; paper. Perth, 1906: A. Curtis, Acting Government Printer.

"Report of the Commissioner of Education for the Year Ending June 30, 1904." Volume 2. Pp. 2480. 6x9 in.; cloth. Washington, 1906: Government Printing Office.

"The Mineral Pigments of Canada." By V. W. Willmott. Geological Survey of Canada. Publication No. 913. Pp. 39. 7x10 in.; paper. Ottawa, 1906; S. E. Dawson.

"Preliminary Report on the Rossland, B. C., Mining District." By R. W. Brock. Geological Survey of Canada, Publication No. 939. Pp. 40. 6x9 in.; paper. Ottawa, 1906; Government Printing Bureau.

"Report on the Chibougamau Mining Region in the Northern Part of the Province of Quebec." By A. P. Low. Geological Survey of Canada, Publication No. 923. Pp. 61, with map. 7x10 in.; paper. Ottawa, Government Printing Bureau.

"Western Australia. Statistical Register for the Year 1904, and Previous Years, Compiled in the Government Statistician's Office from Official Returns." Part. III—Accumulation. Pp. 38. 8x13 in.; paper. Perth, 1906: A. Curtis, Acting Government Printer.

"Queensland. Annual Report of the Under Secretary for Mines to the Honorable J. W. Blair, M. L. A., Secretary for Mines, Including the Reports of the Wardens, Inspectors of Mines, Government Geologists, Government Analyst, and Other Reports, for the Year 1905." Pp. 166, with geological sketch map; illustrated. 8x13 in.; board covers. Brisbane, 1906: George Arthur Vaughan, Government Printer.

"La Metallurgia del Mercurio." By Vincenzo Spirek. Pp. 26; illustrated. 6x9 in.; paper. Torino, Italy, 1906: Tipografia G. U. Cassone.

The substance of this publication is the paper presented by the distinguished European metallurgical engineer at the Sixth International Congress of Applied Chemistry at Rome, April, 1906. It enumerates the sources of the world's supply of mercurial ores and then discusses the metallurgy of mercury, describing all the apparatus employed and the usual methods of smelting. The paper closes with a detailed description of the only Italian mercury deposit, Monte Amiata, and of the plant and process there used.

"Indiana. Department of Geology and Natural Resources. Thirtieth Annual Report." W. S. Blatchley, State Geologist. Pp. 1494; illustrated, 6x9 in.; cloth. Indianapolis, 1906; State Printer and Binder.

State Geologist Blatchley's annual report, just issued, deals largely with the

road-making materials of Indiana. The report shows that the State is abundantly supplied with materials suitable for the construction of highways, and that these are widely distributed. In only eight counties of the 92 is it necessary to import gravel or stone.

Mr. Blatchley gives an interesting review of the history and development of the Indiana highways, after which he quotes engineers on modern road building and then proceeds to a review of the Indiana materials, taking up each county separately. Maps add to the value of the information, and there are tables giving results of physical tests of the materials. An immense amount of care and labor has gone into the production of this report, as the whole forms a guide of the greatest value to road makers. The monograph occupies 1000 pages of the report and is followed by the Indiana road law in full. Mr. Blatchley's report is much sought as being of the greatest importance of any yet issued by the State. The volume also contains an exhaustive review of the coal-mining industry of the State, prepared by State mine inspector, James Epperson, a report of the State supervisor of natural gas, a review of the petroleum industry in 1905, and a paleontological work on the fossils of the Salem limestone.

Polybasite Found at Cobalt.

BY WILLIAM EARL HIDDEN.

This very rich ore of silver has at last been identified among the Cobalt minerals. It occurs associated with argentite (sulphide of silver), native silver (as wires), smaltite (di-arsenide of cobalt), and chalcopyrite (sulphide of copper and iron), and is found in the pink and white calcite veins. It is a compound of sulphur, antimony, copper, iron, zinc and silver, containing when pure, over 75 per cent. of silver. It is not a common mineral but occurs in some abundance at the Silver King mine in Arizona, at several mines in Mexico, in Joachimsthal in Bohemia and Annaberg in Saxony.

It is a brittle black mineral, occurring rarely massive and more commonly in groups of small hexagonal crystals (which are thin plates) in the cavities of the ore. Crystals over ¼in. in diameter are rare. It is often mistaken for zinc blende by the miners and thus overlooked.

Considering the associated minerals it is only a natural result, due to the environing conditions, to see it occur in the Cobalt camp and the wonder is that it has not been identified before. It is one more silver mineral to be added to the 30 odd species now known to exist in the Cobalt region.

This mineral may, upon careful analysis, prove to be a new species and be entitled to a new name. It now appears to be a very typical polybasite, which name signifies that it is a mineral with many bases.

Note on Commercial Cyanide.

BY H. T. DURANT.*

These notes do not attempt to deal with the relative solvent efficiencies of sodium and potassium cyanides, or with the advisability of valuing cyanide by the percentage of cyanogen instead of by correlating it in terms of potassium cyanide, or with the moral or legal right of vendors to sell crude sodium cyanide, and to describe it as practically pure potassium cyanide.

In some cyanide plants, especially those in which the actual dissolving of the gold is effected by means of weak solutions (i.e., solutions in the neighborhood of 0.05 per cent. KCN, or lower), it is advisable, or even essential, to drip in more or less continuously strong cyanide solution at the head of the extractor boxes. In these circumstances special effects are observed with cyanide containing certain impurities.

At the present time several makers of cyanide are selling nicely "adjusted" material described as 98 to 100 per cent. KCN, which is actually mainly sodium cyanide, containing about 25 per cent. of material more or less useless and deleterious.

The following two analyses are fairly typical:

1.

Potassium cyanide	11.90%
Sodium cyanide	65.70%
Sodium carbonate	9.30%
Caustic soda	5.90%
Other sodium salts and undetermined	7.20%
Total	100.00%

2.

Sodium cyanide	74.90%
Sodium carbonate	14.30%
Sodium cyanate	1.30%
Other sodium salts and undetermined	9.50%
Total	100.00%

In cases where the ore, sand or slime, as the case may be, contains much soluble or insoluble acid, and lime is used for neutralizing purposes, the solutions are highly charged with, if not actually saturated with, calcium sulphate. If cyanide as above, containing alkaline carbonate, be used for dripping in at the heads of the extractor boxes when the working solutions contain lime and calcium sulphate, one or both, then much or all of the calcium carbonate formed by double decomposition is precipitated under the screens in the zinc boxes, and on the zinc shavings in a crystalline condition.

As an immediate result the efficiency of the precipitation of the gold by the zinc shavings is impaired, owing to the active surface of the zinc being partially insulated from the gold-bearing solution by the coating of calcium carbonate. Subsequently after cleaning up, the zinc-gold slimes contain calcium carbonate. If these slimes are treated with sulphuric acid there is, as far as the calcium carbonate is concerned a gain in weight of over 70 per cent., due to the formation of hydrated calcium sulphate, and therefore an excessive waste of sulphuric acid, an increase in the weight of material to be smelted, and increased labor and expense in smelting.

For this reason, it has been found advisable in several plants to use a preliminary treatment with hydrochloric acid until calcium salts are dissolved, and then to remove the calcium-chloride solution before proceeding with the sulphuric-acid treatment. I am aware that (probably for the same reason) this preliminary hydrochloric-acid treatment has already been used for a considerable time at the Homestake mine and possibly elsewhere.

Various writers, in giving analyses of zinc-gold slimes after sulphuric-acid treatment show high percentages (even up to 40 per cent.) of calcium sulphate; in most, if not all, cases this calcium, before sulphuric-acid treatment, existed as carbonate, showing that there has been a large consumption of sulphuric acid merely to convert calcium carbonate (easily smelted) into calcium sulphate (refractory to smelt) and incidentally thereby obtaining a large increase in weight and consequently low-grade slimes for smelting.

Personally I have found that, where hydrochloric acid is not obtainable, it is far more economical and satisfactory in all respects not to use sulphuric-acid treatment at all for any of the lighter zinc-gold slimes, but rather to smelt without sulphuric-acid treatment all the fine slimes containing the calcium carbonate, confining the sulphuric-acid treatment solely to the fine zinc and the very heaviest precipitate.

Further than this, the presence of calcium sulphate during the process of dissolving the zinc with acid, undoubtedly results in the retention of zinc as such by the precipitate, greatly increasing the amount of zinc which it is impossible to dissolve by acid.

It is known that in the treatment of certain ore slimes the addition of alkaline carbonate to the treatment tanks is beneficial, but it is difficult to see the benefit of dripping in alkaline carbonate at the head of the extractor boxes when only alkaline cyanide is wanted. It must also be borne in mind that alkaline carbonate is not protective alkali. Further, if required, alkaline carbonate can usually be purchased more economically than is the case when purchased along with sodium or potassium cyanide.

It appears advantageous and economical either to purchase potassium cyanide of actually a high degree of purity, leaving little or no room for adjustments or for the presence of useless and at times harmful ingredients; or on the other hand to

*Buluwayo, Rhodesia.

use sodium cyanide of the highest degree of purity obtainable, that is, the material commercially known as sodium cyanide. 128-130 per cent.

The Deister Concentrator.

The Deister concentrating table has recently received favorable attention as a result of the exhaustive test it has received at the Baltic mill in the Michigan copper district, extending over a period of six months, in the treatment of slime. The results have led to the installation of this kind of table at several of the Copper Range Consolidated's mills. The particular advantages of this table are its smaller floor space, its greater capacity and cleaner separation, its lightness, its high running speed, and the relatively small amount of power necessary to run it.

The concentrator consists essentially of a rhombic, linoleum-covered table, supported on a swinging upright under each of its four corners and elevated 1 in. at one end. A simple device at one side gives the table a reciprocating movement in a direction across its long axis, in this respect differing from the movement of the Wilfley table. The wooden riffles on the surface likewise extend across the long axis of the table, and therefore at right angles to the slope of the surface. The riffles are alternately long and short, the long ones reaching clear across, and, at intervals, a higher riffle separates the groups of lower ones, whereby the flow of water is retarded and a series of pools is formed, in which the water is relatively quiet. This is designed to allow the ore particles a better chance to separate and classify. The pulp is fed across the whole width of the table at its high end and most of the heavy heads are discharged from the side within 18 in. of the feed. This removes the heavy minerals from interference with the rest of the pulp during its classification. The head and the middlings are discharged along the edge of the table while the tails flow off at the bottom end. Devices are provided for adjusting the inclination, and the speed and amplitude of the reciprocation, while the table is in motion.

The Deister table occupies a floor space 8 ft. square. It weighs 1000 lb., crated for shipment. It consumes but 1/5 h.p., and is operated at a speed of 320 r.p.m. The foundation and underpinnings are made of steel shapes, and the table is made of wood, strongly braced to prevent warping. All the working parts are easily accessible, and can readily be replaced.

The results of the table are best on sands of 20-mesh or smaller, although its principal feature at the Baltic mill has been to make economical the treatment of the overflow from settling boxes. The ones formerly used, the overflow from which was discarded, are now being enlarged so as to supply a slime feed for the new table, and thus save some amount of copper.

The table is built and marketed by the Deister Concentrator Company, Fort Wayne, Indiana.

The Sault Ste. Marie Canal.

Traffic passing through canals at the Sault Ste. Marie in July was 7,732,771 tons. For the season from the opening of navigation to Aug. 1 the total freight was, in short tons:

	1905.	1906.	Changes.
East-bound.....	16,490,111	18,386,401	I. 1,896,290
West-bound.....	3,347.093	4,224,150	I. 877,057
Total..... ..	19,837,204	22,619,551	I. 2,773,347

The total increase this year was 14 per cent. The number of vessels passing the locks this year was 10,451, showing an average cargo of 2164 tons. The mineral freights included in the totals were as follows, in short tons, except salt, which is in barrels:

	1905.	1906.	Changes.
Anthracite.....	436,972	321,857	D. 115,115
Bituminous	2,513 601	3,248,505	I. 734,904
Total coal.....	2 950,573	3,570,362	I. 619,789
Iron ore	14,856,083	16,018,806	I. 1,162.723
Pig & manuf. iron	83,823	186 635	I. 102 812
Copper..	45,735	52 657	I. 6,922
Building stone....	7,038	640	D. 6,398
Salt, bbl..... .	224,720	207,673	D. 17,047

The increase in iron ore was rather less than had been anticipated; on the other hand, the gain in coal traffic was more than had been expected.

The glaring red of red lead may be modified by the addition of a slight amount of lamp black without injury to the paint.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ended Aug. 7, 1906.

827,702. LEAD-REFINING APPARATUS—Anson G. Betts, Troy, N. Y. Filed Oct. 31, 1902.

827,717. PROCESS OF MAKING COMPOSITE METALS—Thomas A. Edison, Llewellyn Park, N. J. Filed March 30, 1905.

827,721. PROCESS OF PRODUCING SALTS OF OXYACIDS OF CHLORINE—Arthur E. Gibbs, Niagara Falls, N. Y., assignor to The National Electrolytic Company, Niagara Falls, N. Y., a corporation of New York. Filed March 25, 1904.

827,745. ROCK BREAKER AND PULVERIZER—William A. Merralls, San Francisco, Cal. Filed March 27, 1905.

827,746. COAL-MINING MACHINE — Seward N. Mighell, Chicago, Ill. Filed Sept. 26, 1905.

827,767. COKING OVEN—Horace J. Wickham, Manchester, and Frederick C. Rockwell and Wilbur L. Shepard, Hartford, Conn. Filed Sept. 20, 1905.

827,770. ELECTROSTATIC SEPARATOR—Millard Woodsome, Boston, Mass., assignor to Huff Electrostatic Separator Company, Boston, Mass., a corporation of Maine. Filed Jan. 29, 1906.

827,802. PROCESS OF TREATING IRON OR STEEL OBJECTS—Henry L. Hollis, Chicago, Ill. Filed July 7, 1905.

827,813. ROTARY HEATING FURNACE—John McGaff, Toledo, Ohio. Filed April 13, 1906.

827,882. MANUFACTURE OF ARTICLES OF IRON OR STEEL—Erastus E. Pierce, New Brighton, Pa., assignor to Standard Horse Nail Company, New Brighton, Pa., a corporation of Pennsylvania. Filed June 6, 1903.

827,883. GRINDING MILL—Juan H. Reece, Joliet, Ill., assignor to Horace Fred Humphrey and Harry B. Humphrey, copartners, doing business under the firm name of Humphrey & Son, Joliet, Ill. Filed April 18, 1904.

827,903. CENTRIFUGAL SEPARATOR — John J. Berrigan, Orange, N. J. Filed Nov. 7, 1905.

828,095. ROASTING OR OXIDIZING FURNACE. Chauncey E. Dewey, Denver, Colo., assignor to The American Zinc and Chemical Company, Denver, Colo. Filed Sept. 16, 1904.

828,126. ORE STAMP MILL—Thomas E. Lambert, Butte, Mont. Filed Oct. 26, 1905.

828,141. STEAM AND HYDRAULIC DREDGE — Theodore Shade, Aberdeen, Wash., assignor of one-half to J. W. Giffen, Greensburg, Pa. Filed Feb. 16, 1906.

828,142. APARATUS FOR TREATING, REFINING AND PURIFYING METALS—William S. Simpson, London, England, assignor to The Simpson-Cook Company, Baltimore, Md. Filed Dec. 15, 1905.

828,268. PROCESS OF MAKING SULPHUR TRIOXIDE—Henry S. Blackmore, Mount Vernon, N. Y. Original application filed May 11, 1901. Divided and this application filed Dec. 19, 1904.

828,287-828,288. PROCESS OF SILVER EXTRACTION—Francis G. Hobson, Guanajuato, Mexico. Original application filed July 18, 1905. Divided and this application filed Dec. 20, 1905.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Published Week Ended July 28, 1906.

10,881 of 1905 C. Vautin, London. The use of magnesium or aluminum silicides for reducing metals from their oxides, and the application of the process for welding iron and steel.

12,870 of 1905. K. Goldschmidt and J. Weber, Essen, Germany. In the inventors' process for removing tin from scrap by means of chlorine gas under pressure, subsequent methods of treating the detinned scrap so as to make it suitable for use as scrap iron in the Siemens-Martin furnace.

13,191 of 1905. E. Piepenbring, Dortmund, Germany. Improvements in miners' lamps in which electrically locked bolts are used.

13,433 of 1905. R. W. E. McIvor and F. M. Fradd, London. Extracting gold from complex ores by means of chlorine generated in the mixture by the addition of manganese ores containing the dioxide, magnesium chloride and steam.

16,490 of 1905. L. Brunet, Brionde, France. Producing pigments of antimony and arsenic sulphides by acting on the alkaline sulpho-antimoniates or sulpho-arseniates with sulphurous acid produced by roasting sulphites, the by-product being an alkaline hyposulphite.

99 of 1906. Societe de Biache St. Vaast, Paris, France. A pneumatic apparatus for charging zinc retorts.

1356 of 1906. F. Andre, Neustadt, Germany. A cementation process for producing steel, using a packing material composed of a mixture of ferrocyanide of potassium, leather parings, charcoal, graphite, nitre, etc.

3536 of 1906. J. C. Ponthus, Lyons, France. Production of a double acetate of copper and lime which is specially applicable for removing mildew on vines.

7597 of 1906. Allmanna Svenska Electrical Company, Westeras, Sweden. Method of introducing electric currents into blast furnaces by providing an annular chamber at the bottom for receiving molten metal, into which the iron core of a magnet dips.

7819 of 1906. J. Ephraim, Berlin, Germany. Making lithophone unaffected by sunlight by adding a salt such as carbonate of soda or phosphate of soda.

11,371 of 1906. J. Tcherniac, London. Separating alkaline cyanides from their solutions in water by adding a caustic alkali.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Col. E. A. Wall, of Salt Lake, has gone to Alaska on a pleasure trip.

D. B. Huntley has removed from Helmville, Montana, to Oakland, California.

W. C. DuBois has gone to Slocan City, B. C., to re-assume charge of the Arlington mines.

Edwin E. Chase has returned to Denver from a professional trip to Wyoming and Montana.

W. Spencer Hutchinson left Boston last week for a short trip to Nova Scotia, to examine a barytes property.

Percy E. Barbour has returned to the East after spending 10 weeks in New Mexico examining mining properties.

C. Colcock Jones has returned to Los Angeles after an extended trip through southern Nevada on professional business.

A. J. Huneke, of Butte, Mont., is inspecting the property of the Copper World Extension Company in Okanogan county, Washington.

S. Herbert Williams, Salt Lake City, leaves for Ely, Tonopah, Manhattan and other Nevada camps in the interests of Eastern capitalists.

H. T. Bovey, professor of engineering at McGill University, Montreal, has been elected an honorary fellow of Queen's College, Cambridge.

Francis Drake, of London, passed through New York last week on his way to New Zealand to examine some mining properties for London parties.

Thomas W. Gibson, deputy minister of mines for Ontario, has gone north on a trip to Cobalt, the Gillies timber limit and other mining regions.

H. M. Chase, president of the Pleanto Coal Mining Company, Syracuse, N. Y., has started on a canoe trip to James Bay which will occupy several months.

Walter C. Orem, manager of the Utah Apex and Nevada Copper Companies, the latter operating at Yerington, Nevada, has returned to Salt Lake from a trip East.

Capt. T. H. Trethewey, manager of La Plata mines, situated near Nelson, left that city Aug. 4 for Sherbrooke, Quebec, where he will attend a general meeting of the company.

Charles M. MacNeill, president, and K. R. Babbitt, general attorney, of the Utah Copper Company, have been inspecting the mine and mills of that corporation in Utah.

Edward Walker, formerly chemist of the Montana Zinc Company, at Walkerville, Mont., has been appointed chemist for the Pittsburg & Montana Copper Company at Butte.

Robert C. Morris, of New York, who was appointed receiver for the Montana Zinc Company, the plant of which in Butte, Mont., was destroyed by fire recently, is in Butte in the interest of the company.

Henry Stanley Renaud, of Waller & Renaud, consulting chemists, of 159 Front street, New York, has recently been admitted to the bar, and will devote his attention to chemical, techno-legal and patent cases.

C. J. Adami has taken charge of the property of the Cable Lease Mining Company, 20 miles west of Anaconda, Mont., succeeding Harry C. Bacorn, resigned. Mr. Adami was formerly superintendent of the Gagnon mine in Butte.

C. D. Clark, recently with the Arizona Copper Company, passed through New York last week on his way to London. He will shortly start for Mandalay, Burma, where he will represent Bewick, Moreing & Company, of London, and have charge of work in that company.

S. S. Fowler, of Nelson, B. C., has resigned as manager of the Cascade Water Power and Light Company, and W. Anderson, for several years resident superintendent of the company's power system at Cascade, B. C., has been appointed to succeed him. Mr. Anderson only recently returned from England, whence he had been to confer with the directorate.

Obituary.

Edgar Brown, one of the pioneers on the Vermillion and Mesabi iron ranges in Minnesota, died at Sault Ste. Marie Mich., Aug. 6. He realized little money benefit from his discoveries in the end, and died poor.

P. H. Laufman, of Pittsburg, one of the pioneer steel manufacturers of this country, and early interested in the production of tin-plate, died at his winter home in Southern Pines, S. C., Aug. 6, at an advanced age. Mr. Laufman's father was an iron maker in the Cumberland valley. The son removed to Pittsburg in 1840, and a little later began the manufacture of hardware. He organized the firm of P. H. Laufman & Co., and began the manufacture of tin-plate in 1888. He retired from business after selling his mills to the United States Steel Corporation. Three daughters and a son survive him.

A. McCharles, one of the pioneers of Sudbury nickel-mining, died at Montreal Aug. 5. He was originally from Cape Breton, but moved west with his parents as a boy. He did much exploration work in Manitoba and the Canadian West, and his researches contributed materially to the available information respecting the superficial geology of the country. Mr. McCharles has been a prominent figure in connection with Sudbury nickel-mining from the outset of that industry, and concerned himself actively in public questions relating to mining affairs. He was for several years the Sudbury correspondent of the JOURNAL and few men had a more intimate acquaintance with the district.

E. B. C. Hambley died Aug. 13 at Salisbury, North Carolina, aged about 45 years. Col. Hambley was a well known mining engineer; an Englishman, who came to North Carolina some 25 or 30 years ago. He has been identified with some of the largest mining enterprises in the State, and at the time of his death was manager and vice-president of the Whitney Company, which is putting in a five-million-dollar power plant on the Yadkin river in Stanly county. He was married about 19 years ago to Miss Lottie Coleman, of North Carolina, who survives him; he leaves a family of four boys and one girl. His estate is a large one, and he was connected with many important and paying enterprises. Besides his connection with the Whitney Company, he was vice-president of the Davis & Wiley Bank, Salisbury, N. C.; a director in the Salisbury cotton mills, the Yadkin Land Company and many other enterprises.

Societies and Technical Schools.

American Mining Congress—The next meeting of this body will be held in Denver, Colo., beginning Oct. 16, and continuing four days. The local committee has prepared a program for the business of the meeting and the entertainment of visitors.

Industrial.

Shirley & Grant, of Reno, Nevada, have entered into a contract with the Traylor Engineering Company, of New York, whereby they have become the sole representatives of that concern for the entire State of Nevada.

The Tri-Bullion Smelting and Development Company has ordered of the Traylor Engineering Company, New York, a complete steam-hoisting equipment, to operate to a depth of 700 ft., for its mine at Kelly, New Mexico. The equipment will consist of a double-cylinder, single-drum hoisting engine, a portable tubular boiler, two 15-cu.ft. ore buckets, a galvanized-iron water tank, and all the accessories.

The McCune Iron Company, Birmingham, Ala., has been incorporated with a capitalization of $75,000. J. H. McCune is president and general manager. The new concern has acquired the plant of the Birmingham Engineering and Construction Company, which was recently thrown into bankruptcy at North Birmingham. It is intended to make improvements at the plant and resume operation at the earliest possible moment.

The Pennsylvania tunnels under the East river, New York, which have a length of 3900 ft., show many features of unique construction and advanced appli-

cation of mechanical appliances. One feature is the method employed in reducing the stone excavated from the tunnels to material suitable for concrete by a complete rock-crushing plant installed at each end of the tunnel. On the New York side, part of the stone excavated in the tunnel is delivered from the shafts to a No. 5 K Gates breaker built by the Allis-Chalmers Company. A complete stone-crushing plant has been placed here for screening and elevating the crushed stone to storage bins, which, in turn, deliver the material to the concrete-mixing machines as required, discharging into 1-yd. steel buckets which the traveling cranes load on cars running to the shafts on narrow-gage tracks. A plant installed outside the power house includes two ash hoists, a pug mill, a concrete mixer and an Allis-Chalmers No. 5 K Gates crushing plant with screens and elevators complete, operated by a type N motor of 40 horse-power. Cars of rock, suitable for concrete, are diverted from the dump track and discharge their contents on the opposite side of platforms adjacent to the stone crushers. From the crushers the stone is taken by a bucket elevator to the top of a tower about 30 ft. long, where it is passed through cylindrical screens and the rejected portions chuted back to the crushers. The screened stone is delivered continuously to side-dump cars, on an elevated platform, which discharge it into storage bins at the top of the concrete tower and into boats at the end of the pier; or, running in the opposite direction, deliver it to a 200-yd. storage bin.

Trade Catalogs.

Receipt is acknowledged of the following trade catalogs and circulars:

Geo. D. Feidt & Company, Philadelphia, Penn. Price List of Filter Papers, enclosing samples.

The Bristol Company, Waterbury, Conn. Recorders; Pp. 11, illustrated; paper, 2x5 in. 1906.

Henry Troemner, Philadelphia, Pa. Catalog B. A. L. Assay-Pulp-Analytical Balances. Pp. 40, illustrated; paper, 6x9 in.

Crocker-Wheeler Company, Ampere, N. J. Bulletin No. 66. Motors for Rolling Mills; Pp. 8, illustrated; paper, 6x9 in 1906.

Chicago Pneumatic Tool Company, Chicago, Ill. Catalog XIX, Keller Pneumatic Stone Tools; Pp. 48, illustrated; paper, 6x8 in. 1906.

Wellman-Seaver-Morgan Company, Cleveland, O. Circular No. HO-7, High-Grade Geared Hoisting Engines; Pp. 32, illustrated; paper, 6x9 in. 1906.

Sullivan Machinery Company, Chicago, Ill., Modern Methods of Producing Coal. Part 1. Catalog 57; pp. 55, illustrated; paper, 6 by 9 in.

The Denver Engineering Works Company, Denver, Colo. Bulletin No. 1028. Revolving Grizzly; Pp. 4, illustrated; paper, 8x10 in. 1906.

William Butler, 20, Crosby Road, Southport, England. Butler's Patent Swincam Camera Stand; Pp. 16, illustrated; paper, 4x6 in. 1906.

Albert B. Porter, Chicago, Ill. The Scientific Shop. Circular No. 330—Heliostat, and 346—Refractometers; Pp. 8, illustrated; paper 6x8 in. 1906.

The Cambridge Scientific Instrument Company, Ltd., Cambridge, England. List No. 39, Technical Thermometry; Pp. 62, illustrated; paper 8x12 in. 1906.

The Hendrie & Bolthoff Manufacturing and Supply Company, Denver, Colo. "Equipment News;" Pp. 20; illustrated; paper, 8x10 in. July-August, 1906.

Stephens-Adamson Manufacturing Company, Aurora, Ill. Conveying and Transmission, June, July and August, 1906; Pp. 23 each, illustrated; paper, 6x8 in. 1906.

Cooper Hewitt Lamp Company, Garrison Place and Fayette Street, Pittsburg, Pa. The Economical Lighting of Industrial Plants. Pp. 29, illustrated; paper, 5x8 in. May, 1906.

Economy Drawing Table Company, Toledo, Ohio. The Economy Drawing Tables. Sectional Filing Cases and Specials in this line. Pp. 24, illustrated; paper, 5½x8½ in.

Reading Iron Company, Reading, Pa. Genuine Wrought Iron Pipe. Pp. 3, illustrated; paper, 6x9 in. Wrought Iron Pipe vs. Steel Pipe. Pp. 12, illustrated; paper, 6x9 in.

The Christman Company, Massillon, Ohio. Manufacturers of Complete Mine Equipment, Miners' Drills and Drilling Machinery for all purposes. Pp. 19, illustrated; paper, 6x9 in.

American Water Softener Company, 1011 Chestnut St., Philadelphia, Pa., and Outlook Building, Columbus, Ohio. American Water Softener. Pp. 48, illustrated; paper, 6x9 in.

H. W. Johns-Manville Company, New York. Insulation of Underground Pipes Conveying Steam and Hot Water, by the Portland Conduit System; Pp. 12, illustrated; paper, 3x6 in. 1906.

Metropolitan Engineering Company, 124 West 42nd St., New York City. Volume 2, Number 7. Bulletin of the Metropolitan Engineering Company. Pp. 8, illustrated; paper, 6x9 in. July, 1906.

The Denver Engineering Works Company, 29th to 31st on Blake Street, Denver, Colorado. Bulletin No. 1027. Tube Mills for Ore Crushing. Pp. 10, illustrated; paper, 8x10½ in. June, 1906.

Power and Mining Machinery Company, Cudahy, Wis. Loomis-Pettibone Gas Generating System Operating Gas Engines for Power. Publication No. 102; Pp. 15, illustrated; paper, 6x9 in. 1906.

Vulcanite Portland Cement Company, Land Title Building, Philadelphia, Penn., and Flatiron Bldg., New York. Vulcanite Pamphlet No. 5. Fireproof Hotel Construction. Pp. 19, illustrated; paper, 6x9 in.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio. Bulletin M. 104. Copper Converters and Equipment. Pp. 7, illustrated; paper, 6x9 in. Bulletin M. 103. Stamp Mills and Equipment. Pp. 7, illustrated; paper, 6x9 in. 1906.

Construction News.

Quartz Hill, California—A steam-hoisting plant is to be installed at the Meek mine. S. A. Meek, Quartz Hill, Cal., is owner.

Epes, Alabama—The Minona Cement Company is preparing to build works, and will need machinery. Thomas G. Kenan, Selma, Alabama, is in charge.

Providence, California—The Trojan Mining Company will add 10 stamps and other improvements to its mill. A. M. Rockwell, Fenner, Cal., is manager.

Gold Butte, Nevada—The Kimberly-Nevada Mining Company is preparing to put in hoisting and pumping machinery. O. Wiser, Kimberly, Utah, is the manager.

Breckenridge, Colorado—The Washington mine is to have a concentrating and separating plant to take care of the zinc ores. Address at Breckenridge, Colorado.

Crab Orchard, Tennessee—The Wilson Coal Company is preparing to enlarge operations at the Renfro mines and will need machinery. Charles E. Keyes, Crossville, Tenn., is general manager.

Capon Iron Works, West Virginia—The furnace at Capon Iron Works in Hardy county is to be rebuilt and the mines near by are to be reopened. Wm. Barney and M. Landour, Wardenville, W. Va., are in charge.

Monterey, Tennessee—The coal properties of the Obey River Coal Company near Monterey have been leased to parties who will open a mine and put in hoisting and pumping machinery. F. J. Fuller, Nashville, Tenn., is in charge.

Ainsworth, British Columbia—The wagon road from the head of Kootenay lake to Argenta mine, owned by the Argenta Mines Company, of Boston, Mass., has been completed, and 125,000 ft. of lumber and about 50 tons of machinery have been hauled over it to the mine. The high-pressure half of a 10-drill air compressor has been installed. This machine is direct-connected to a 9-ft. Pelton waterwheel having a spindle nozzle—a new type. Some 300 h.p. is obtained from Hamil creek, with much more available. The water is conveyed in half a mile of 36x30-in. wood flume, and thence through a 30-in. steel penstock to the power plant, having about 120-ft. head.

Special Correspondence.

San Francisco. Aug. 8.

This city is face to face with many labor problems just at the time when skilled mechanics and ordinary laborers are very necessary. Wages in all branches have increased materially and the end is not yet. The fact is, there is a great scarcity of labor.

The Associated Oil Company, one of the great fuel-oil corporations of the coast, has temporarily passed the payment of its semi-annual dividend, which was due Aug. 1. The dividend amounts to 1½ per cent. on $22,838,392 of stock. In a letter sent to the stockholders by Vice-president W. S. Porter, the following reasons are assigned for this action: During the past 12 months the company has purchased a pipe-line from Coalinga to the ocean, tank stations at Monterey, Honolulu, Portland and Tacoma; a pipe line from Santa Maria to Gaviota, a refinery at Gaviota, oil properties and six vessels for carrying oil at a cost exceeding $4,000,000. About one-half of the purchase price of these properties was paid in cash. The remainder was to be paid from the proceeds of a bond sale. A large part of the bond issue had been underwritten when the recent fire disturbed trade and finances in California, and the directors concluded that it would be better policy to apply the surplus earnings in reducing the indebtedness of the company.

The Independent Order of Odd Fellows has a beautiful tract on the high bluffs on the banks of the Feather river near Oroville, where it maintains a home for indigent or aged members of the order. Some time since the order bought 28 acres on the flat or low lands below the bluffs and in the river bottom, the original cost being about $8000. Recently an offer of $30,000 was made for the low-land by a dredging company that desires to work it for the gold in it. It is believed that $60,000 would be offered if the land were put up at auction. At the last meeting of the Grand Lodge the proper authorities were authorized to sell or lease this land or to prospect it for the good of the order, and to take such action as would be most advantageous.

Greenwater, in Inyo county, this State, 85 miles southeast of Rhyolite, Nevada, is the latest field for a rush from the Nevada camps. The copper finds there recently have brought about an excitement equal to that at Bullfrog two years ago. Hundreds of people from Tonopah, Goldfield, Lida, Palmetto and the Bullfrog towns are traveling toward Greenwater in all sorts of conveyances. As high as $200 is being paid to automobile companies for transportation by wealthy operators who are anxious to get in early. Greenwater is located at the southern end of the Funeral range of mountains and is directly in the line of the great mineral belt that extends north into southern Nevada, from California.

Regardless of the heat at this season, many prospectors are braving the dangers of the Death valley section in Inyo county in search of open ground. Some of the big deals of the year are being made in that section, and a rush is expected as soon as the heat becomes less intense. In many places the thermometer seldom gets below 100 deg. night or day at this time of the year. In San Bernardino county the conditions at this time are pretty much the same. Many wild reports of rich finds are being sent out by those who are trying to unload claims at high prices. Inexperienced men, not used to the conditions in the desert regions, should avoid those sections of the State until cooler weather prevails.

The North Star mine in Grass valley has reached a depth of more than 4500 ft. on the incline. Two 40-stamp mills are kept running constantly on the ore. Last year the mine produced $860,000 from ore that averaged from $10 to $12 a ton. By the end of the year the mine will be about one mile deep on the incline of the ledge, as sinking goes on at the rate of 100 ft. a month.

According to the authorities of the University of California at Berkeley, there has been a great demand for the graduates of the California college of mining. More than half the class of nearly 40, who graduated in May, 1906, secured positions as soon as they had finished their examinations. The demand for mining graduates is greater than the supply.

All the railroads in this State are greatly in need of laborers on their lines. In the mining districts of Arizona and Nevada the railroad laborers desert daily to enter the mines, where promises of greater wealth are held out. The Salt Lake road recently started 100 Japanese on a train from Los Angeles, to the Las Vegas-Tonopah extension, but so many of the men got off the train at mines along the route that but 20 arrived at the point of destination. At another point 200 laborers, mostly Japanese, quit in a body to look for other employment.

By a recent decision of the Appellate Court the title is settled to some 7000 acres of valuable land in Shasta county, David T. Doak being declared the rightful owner. The land lies on the north side of Pitt river and extends from the Sacramento river to the town of De La Mar. It is estimated to be worth $50,000 and is valuable particularly for deposits of copper and iron near the mouth of the McCloud river. Now that the title is settled, after long and tedious litigation, it is expected that these valuable deposits will be developed.

Because their mining claim at Rackerby, Yuba county, did not yield gold in quantities to meet their expectations, Hammett & Correll, late of Tuolumne county, have had several meetings with their mountain creditors in Marysville. It is not likely that the mine will be operated again.

Salt Lake City. Aug. 11.

There were 11 dividends declared by Utah mining companies during July. The Silver King, at Park City, paid $50,000; the Tintic mining district was represented in the list by eight mines, in which the Gemini led with $50,000; Beck Tunnel, $25,000; Mammoth, $20,000; Grand Central, $15,000; Bullion Beck, $10,000; Victoria, $10,000; Carisa, $5000; Uncle Sam Consolidated, $5000. Mercur was represented by the Sacramento only, which paid $5000, while the Utah, of Fish Springs, came in with $2000. The dividends of the Utah Consolidated and United States companies were paid during the month, but declared in June.

Jesse W. Fox, of Salt Lake, has brought suit against the Beck Tunnel Consolidated for stock valued at $4000, and dividends amounting to $660. He asks for the transfer of stock which the company claims was sold for delinquent assessments.

The new Garfield smelter of the American Smelting and Refining Company, which has been under construction during the past ten months, and has cost over $2,000,000, is in commission.

The Sacramento Gold Mining Company, of Mercur, shipped 400 flasks of quicksilver this week.

The shareholders of the Steamboat Mining Company, Big Cottonwood mining district, have ratified a sale of the property of the company by the directors to Jesse Knight, of Provo.

The Carisa Mining Company, of the Tintic district has closed a contract to deliver 40,000 tons of crude ore to the Bingham Junction plant of the United States Smelting, Refining and Mining Company.

At a meeting between a committee, representing Tintic mine owners, and representatives of the traffic department of the Rio Grande Western and San Pedro, Los Angeles & Salt Lake railroads, the latter called for figures bearing on the tonnage of ore produced by the mines of the Tintic district during the past year, and an estimate on the probable output during the coming year. The question of a lower freight tariff on ore shipped to the Salt Lake valley smelters was up between them. Producers are asking for what practically amounts to 50c. per ton. The rate asked for is 75c. a ton on iron fluxing ore; $1 a ton on ore of the value of $15 or under; $1.50 on ore having value above $15, and not over $20, and $2 on everything above $20. The haul to the smelters is from 80 to 90 miles.

The management of the United States Smelting and Refining Company has let a contract for two additional converter stands, which will give the plant a battery of five for its Bingham Junction plant.

There have been no new developments in the coal-land and fraud cases since the filing of the suits against the Utah Fuel and Pleasant Valley coal companies last week. The United States will undertake to have title to between 20,000 and 30,000 acres of coal lands in Carbon county vacated, as well as to be remunerated for the value of the coal extracted therefrom. The fact that on the lands involved, which the Government alleges have been obtained through the working out of a conspiracy to defraud, are located the coking ovens from which the smelters of Utah and Montana are supplied, also that prominent officials of the company and their agents are named as the conspirators, while former State officials, including the governor, have come in for severe censure, makes the cases the most important, perhaps, ever brought to the attention of a Utah court. The fact that the law firm with which Senator George Sutherland is associated is now in the employ of the defendants, and was at the time that the frauds are said to have been committed, has given the Senator cause to retire from the firm with which he has long been connected.

The July ore and bullion settlements, at Salt Lake, amounted to $2,668,750 in all.

The post office department has authorized the establishment of a post office at Goldsprings, Iron county, Utah, a new camp which has begun to attract considerable attention. It has a population of about 50 persons.

The Mines Exploration Company has been formed, with Charles M. MacNeill and other officials of the Utah Copper Company as the promoters.

Denver. Aug. 10.

The American Smelting and Refining Company has issued a circular letter to the sampling works, notifying them of an advance in the price of lead amounting to 14½c. per unit of 20 lb. over last month's schedule, while the smelter charges have also been reduced $1 per ton. Before long this company will probably cease to control the ore from the Cripple Creek district to the extent it has for some time past, as the large Golden Cycle plant, now in course of construction at Colorado City, with a capacity of 500 tons daily, will probably treat the product of the mines of the Stratton estate, besides that of a number of other producers, some of whom, it is understood, have already made contracts with the new concern.

The old group of Gunnell mines, which has a record of having produced more than $8,000,000, one of the oldest properties of Gilpin county, has just been transferred to a company of Eastern capitalists, the sale including the stamp mills, and it is understood that a large amount will be spent to bring about a heavy production. About two years ago fire destroyed the shaft-house and upper workings, and the property has been idle since. A new plant will be installed.

It seems to be the general opinion that while the intermediate tunnel in the Cripple Creek district would afford relief quicker, it would be wiser to construct the deeper tunnel, as the difference in cost, amounting to $80,000, would be counterbalanced by the additional deposits reached, while it would only take about six months longer to construct it.

In order to avoid expensive litigation over apex rights the New Haven and Joe Dandy properties have been consolidated.

The suit between the Creede & Cripple Creek Company and the Uintah Mining, Tunnel and Transportation Company has been compromised, the former paying a cash consideration under the terms of the settlement.

State Commissioner of Mines E. L. White has just issued a bulletin showing that the number of accidents in metalliferous mines in Colorado is too large in comparison with other mining districts, and he will undoubtedly enforce the laws in regard to the proper safeguards being provided by the mine managers.

In the order of withdrawal issued by the Interior Department there are included more than half a million acres of the best coal land in Routt county. It is stated that frauds have been committed in connection with filings on lands in that vicinity, which the Government will probably investigate and annul.

Platteville, Wis. Aug. 10.

Milwaukee capital still continues to become interested in several of the new propositions in the vicinity of the Linden. The Economy and Linden mining companies are both close corporations, the former with a capitalization of $60,000, and the latter $75,000. It is claimed that both mines are on the famous Ross & Robart ranges, and that ore was found in every one of the 18 holes drilled on both properties. The assay of the drillings is quite interesting as they show an average of 15.8 per cent. zinc in what is termed locally the "blue rich" and 17.2 per cent. in the "glass rock," showing every indicative of an extensive vein of zinc blende.

A contract has just been awarded the Galena Iron Works Company for a complete concentrating and magnetic separating plant by the Murphy Mining Company, of Pittsburg, Penn., to be erected at its mine near Hazel Green camp and not far from the Kennedy mine. The concentrating plant is to include the usual installation. The Murphy Company has just added to the plant a large Ingersoll class A compressor. The development work at the Murphy under the present management has been carried on for over two years.

The Hazel Green mill and roaster resumed operation again this week; this is the first running since the main shaft-house and power-house were destroyed by fire last spring.

After experiencing considerable difficulty due to improper machinery, the Unity is again in operation after having new machinery placed by the Galena Iron Works. Among the improvements added was an Ingersoll-Rand compressor and drills.

It is reported that a deal has been closed whereby the Baxter mine near Cuba City passes into the hands of Ishpeming, Mich., capitalists. The consideration is not positively known, but from reliable authority it is said to be $600,000.

What promises to be one of the coming producers is the Paragon mine near Buncombe camp, in the La Fever river valley. The developments are proving up some valuable property. Captain Rodgers, a western mining engineer, is at the head of the management. The main shaft is down some 65 ft., the work being done by air-drills, power for which is derived from a large duplex Rand imperial machine.

Calumet, Mich. Aug. 11.

Copper production by the Michigan mines will be considerably less than normal this month, owing to the labor troubles at some of the properties. At the Quincy the men have been idle two weeks, and consequently production has been discontinued. About 1400 are idle, the strikers demanding a raise of 10 per cent. in wages. There has been more or less unrest manifested by the workmen at the Ontonagon county mines. At the Michigan the trammers struck for a raise of 25c. a day in wages, and when the miners attempted to go to work they were attacked by the strikers, two of whom were shot and killed. Operations were resumed this week with a small force, the miners agreeing to do their own tramming for the present. At the Adventure Consolidated mine the trammers struck, demanding the same increase as that wanted by the Michigan strikers, and production is curtailed. An attempt was made to get the men at the Mass Consolidated mine to strike, but Superintendent James Wilcox averted trouble and discharged the agitator. A part of the force of trammers at the Victoria mine struck, demanding $2.25 a day instead of $2, which is paid now, and when their demands were refused after they had been idle three days, the men returned to work.

Owing to the extreme scarcity of men, it is difficult for the Lake mines to make as large a production as desired. The Copper Range Consolidated Company has increased the pay of all its underground employees at the Champion, Baltic, Trimountain and Globe mines $2 a month, 1500 being benefitted. The Isle Royale, Osceola, North Kearsarge, Tamarack, Wolverine, Ahmeek, South Kearsarge and Mohawk mines have raised the pay of all of their employees 5 per cent.

Scranton. Aug. 13.

The Philadelphia & Reading Coal Company has discovered a vein of coal 14 ft. in thickness at Taylorville, in the Heckscherville valley, and known as the celebrated Red Ash vein. The company is sinking shafts to the sea level in the Pottsville district in the hope of finding additional veins. The land containing the new vein was purchased from an independent operator 20 years ago for a few thousand dollars.

The Lehigh & Wilkes-Barre Coal Company will sink a shaft into the proved coal veins which make up the virgin coalfield between Solomon's creek at the lower end of Wilkes-Barre and the town of Nanticoke, and which, thus far, has scarcely been touched except by the Parrish Coal Company, at the Buttonwood colliery, and those of the abandoned Dundee colliery. The greater part of the coal here belongs to the Lackawanna railroad and here it has recently started the Auchincloss, Bliss and Truesdale mines, which are among the company's big producers, although they have but barely started upon the great beds of anthracite which lie in a dozen veins, the lower vein being at a depth of about 1200 ft. The new breaker of the Lehigh & Wilkes-Barre Coal Company will be located at Hanover Green, and will be one of the largest in the region, being driven by electricity, while electrical haulage will be used in the mine.

Mine Inspector Johnson has commenced equity proceedings against Elliot, McClure & Co. to restrain them from building the new breaker over the mouth of the shaft in Sibley, in the place of the breaker destroyed a few months ago. Under the act of 1891 it is not permissible to erect a breaker within 200 ft. of the shaft. The old breaker was built in 1875, some years before the passage of the law.

The large boiler house at the Pine Knot colliery of the Philadelphia Coal Company was destroyed by fire last week, resulting in a loss of $10,000. The colliery has been idle for a week.

Anthracite coal shipments in July reached a total of 4,981,448 long tons; being 723,589 tons less than in June, bue showing an increase of 434,705 tons, or 9.6 per cent., as compared with July, 1905. For the seven months ending July 31 the shipments, by companies were, in long tons:

	1905. Tons.	Per Ct.	1906. Tons.	Per Ct.
Reading	7,191,510	20.1	6,091,421	20.1
Lehigh Vy	5,799,126	16.4	4,518,412	14.9
N. J. Central	4,503,415	12.8	3,747,210	12.3
Lackawanna	5,424,548	15.4	5,138,008	16.9
Del. & Hudson	3,415,934	9.7	3,060,515	10.1
Pennsylvania	2,859,952	8.1	2,601,626	8.6
Erie	3 573,195	10.2	3,123,155	10.3
N. Y., Ont. & W	1.665,548	4.7	1,318,151	4.3
Del., Sus. & Schu'l	920,512	2.6	768,751	2.5
Total	35,263,740	100.0	30,367,249	100.0

The shipments by months in 1906 have been: January 5,458,048; February, 4,712,099; March, 5,745,868; April, 488,439; May, 3,276,310; June, 5,705,037; July, 4,981,448; total, 30,367,249 long tons. This is a decrease of 4,896,491 tons, or 13.9 per cent., as compared with the corresponding period last year.

The Lackawanna maintains second place in the output of anthracite for the year, this being the first time it has held that position. The Philadelphia & Reading leads, the Lackawanna being second and the Lehigh Valley third.

Valuable coal lands in the city of Pittston have been leased to the Lehigh Valley Coal Company, the lessee to pay a royalty of 40c. a ton for all coal that will pass over a screen with three-fourths of an inch square holes.

After 16 months of continuous work, night and day, week days and Sundays, the stripping work for the St. Clair Coal Company at St. Clair has been completed. The depth of the stripping ranges from a few feet to 70 ft.; 500,000 cubic yards of earth and rock have been removed.

The anthracite mine workers will receive an increase of 1 per cent. upon the base rate of wages for the last month.

The Warrior Run mine, which was the scene of an explosion a week ago, is being flooded to extinguish the mine fire.

Toronto, Ont. Aug. 10.

The mining concessions on the Timiskaming & Northern Ontario Railway right-of-way, and the Northwest 40 acres of Cobalt townsite have been again offered for sale, tenders for which must be received by Aug. 27. The terms for the lease of the right-of-way comprise a bonus of not less than $50,000, a rental of $50 per annum and a royalty of 25 per cent. on the value of all ore mined. For the townsite the terms are a bonus of not less than $22,000 and royalty on a sliding scale of from 15 to 50 per cent., according to the value of the output.

A large number of members of New York stock exchanges and other brokers visited Cobalt this week under the guidance of Starr Bullock and inspected the Nipissing mine and other properties.

Prospecting in parts of Coleman township and up the Montreal river has been seriously interrupted by numerous bush fires, which have caused considerable damage. Fortunately, heavy rains have fallen and the flames have been got under control. The Sudbury region has also been the scene of extensive forest fires.

In view of the discoveries of gold at Lake Opastica and the mineral riches of the tract of country lying east of Lake Temiskaming in Quebec Province, it has been decided to open up the country. Sir Thomas Shaughnessy, president of the Canadian Pacific Railway, having had a conferenece with Premier Gouin of Quebec, has announced that surveyors will at once be sent into the field as a preliminary to the construction of a line of railway tapping the district.

The Dominion Government has adopted an order in council regulating the granting of water-power rights in the Yukon. Applications may be granted on the report of the government mining engineer that the water for which application is made is available, without interfering with other vested interests. Fees for such grants are fixed as follows: For 50 miners' inches or less, $10; from 50 to 200 inches, $25; from 200 to 1000 inches, $50; for every additional 1000, or fraction of a thousand, $50. The location of the ditch must be approved of by the Yukon commissioner, and when power is sold the distribution and price are to be under the commissioner's control.

M. A. Meyers, of Mt. Clemens, and Mr. Hanson, of Buffalo, representing a syndicate of American capitalists who have purchased the Silver Mountain, Badger, Beaver and other properties near Port Arthur, have gone to Silver Mountain to direct operations for pumping out the mine, on which a large force of men is engaged. The other mines will also be pumped out and operated without delay, modern machinery being installed.

Dawson, Yukon. July 20.

Much interest is being paid here to what are called the "White Channel" gravels, and there are many theories as to their origin and value. That they carry gold is established. The "White Channel" is an immense deposit of what could be termed quartz-gravel. It is washed and ranges from fine sand to pieces as large as 25 or 30 lb. The majority of the material is quartz, besides which there is quite an amount of mica-schist and quartz-schist, and smaller amounts of altered quartz porphyry, quartzite and limestone. Unlike a ledge of ore, in this case the question of formation is not of importance. The extent of this deposit is not really known. It strikes through the country in nearly an east and west direction for some 10 or 12 miles or more and is from 1000 to 4000 ft. wide. In some places it is covered by wash from higher mountains; in other places it is cut away by waterways; its bedrock being from 100 to 300 ft. above the bedrock of the creeks.

The working of these gravels has been confined to small operations by drift mining, no water being available for hydraulicking upon more than a small scale. It has been generally conceded that large hydraulic plants would be the only method of recovering values these gravels contain. No thought of any other method of handling had presented itself, until an examination was begun last April. This has proved that a much higher recovery of the values in these gravels can be made by milling and cyaniding than by hydraulicking, even if sufficient water were at hand.

The gold contained in this gravel is of three kinds: (1) Placer gold which can be recovered by hydraulicking; (2) very fine gold which cannot be recovered by hydraulicking; (3) gold contained in the quartz boulders. The second class is

the largest. The presence of the second and third kind make it impossible to mine the entire deposit from bedrock to surface and mill it at a profit. The first class is confined to 8 to 10 ft. above bedrock.

The testing of this gravel has been done in five-ton lots, with a two-stamp mill and a five-ton cyanide plant. The samples were carefully secured, so that each represented the entire depth of the deposit, and were taken from over quite a large area of the deposit.

The results secured are such that the installation of a large mill is assured. This mill in operation and the proposition thus more throughly demonstrated, others will surely follow. The working of these gravels by stamp mill and cyanide plants means heavy investments. The proposition is a large one and profits are comparatively small per ton, so that work must be on a large scale to be profitable.

Dawson is no longer a camp for the individual miner. The creek claims, which have produced millions of dollars, no longer contain pay that can be recovered by former methods. Now the time of dredges and large hydraulic plants is at hand. Large corporations are now securing ground for such operations. Water is being brought in in large quantities, electric power is being provided and other work done in preparation. The life of the camp depends upon these enterprises. These operations will recover values from the worked-out creek claims, untouched benches and hillsides and thousands of acres of dredging ground. The benefit derived from all this by the camp will be great. The development of this "White Channel" proposition has got to be taken up by outside capital, as there are not enough men in the country now with means to undertake such enterprises.

An examination of ground in this "White Channel" means a thorough sampling in at least four-ton lots, from bedrock to surface, and then the milling of these samples. It cannot be sampled like a quartz ledge. There is a two-stamp mill here and a small cyanide plant. There is also a four-stamp mill which could be used for sampling.

Victoria, B. C. July 30.

Rossland—Official figures give the production of the Le Roi mine for six months ended June 30, last, as 61,052 tons of ore, the metal contents of which were as follows: Gold, 24,827 oz.; silver, 36,878 oz.; copper, 1,419,256 lb. During the same period Le Roi No. 2 shipped 12,596 tons of ore to the Consolidated Mining and Smelting Company's works at Trail, and crushed 5344 tons of ore at its own mill, recovering from the latter 314 tons of concentrate. It is expected that production will continue at the rate of about 2100 tons per month of shipping ore of good grade and 1000 tons of lower grade for milling. Most of the work in Le Roi No. 2 is being done in that part of the company's property lying west of the Josie shaft. In fact for the last three years the greater portion of the shipping ore produced has come from that part of the mine, which is considered a most hopeful sign for the extension of the productive area of Rossland camp, no other mines having yet done important development work at depth so far west. The chief work now in progress in the mine is at the 300-, 500- and 600-ft. levels. The Josie shaft is now down 850 ft. on the incline, and levels have been opened at 100-, 200-, 300-, 500- and 700-ft. and what is nominally the 900-ft. level, this last being actually at 850 ft. depth. There are also levels at 400 and 600 ft., but these do not connect with the shaft, being reached by raises from other levels. The amount of development work in this mine is larger in proportion to the quantity of ore produced than in most mines, yet results are profitable, sufficient ore of payable grade having been opened up to assure the profitable operation of the mine for the next two or three years. Paul S. Couldrey is manager.

Rossland—It is announced that A. J. McMillan, general manager of the Le Roi Mining Company, Ltd., has cabled from London, England, instructions to proceed with the deepening of the main five-compartment shaft of the mine from the 1300-ft. to the 1700-ft. level. A winze has already been sunk to the latter depth, and explorations below the 1300-ft. level have disclosed the occurrence of ore of sufficient quality and quantity to warrant the extension of the permanent workings of the mine to the greater depth mentioned. The total production of the Le Roi for the seven months of 1906 is about 75,000 tons.

Silver King—Some 200 tons of silver-copper ore are being taken every month from the Hall Mining and Smelting Company's Silver King mine, which is being operated by the company and M. S. Davys conjointly, under the management of the latter. The ore is excellent grade and is all being taken from the upper workings. No deadwork has been done during the last six months.

London. Aug. 4.

A rather unusual internecine strife among directors and managers of a mining company has recently been waged in connection with the Australian Mining and Gold Recovery Company, the cause of strife being the proposition to adopt a new process, the value of which was undetermined. As a rule, it is perhaps best that these quarrels shall not be ventilated in technical or other papers, but owing to a statement printed by the directors in the annual report relating to the conduct of the general manager it is only fair to all parties that the circumstances should be explained, and the statement in question read in the light of actual facts.

Your readers will remember that the Australian Mining and Gold Recovery Company was originally formed to work the MacArthur-Forrest cyanide process in Australia. During the last four years its business has been confined chiefly to working tailings at Lucknow and at Hillgrove. The latter consist of antimonial gold ores of low grade, containing less than 10 dwt. of gold and about 3 per cent. of antimony; ores unamenable to any known treatment. The directors last autumn proposed that J. S. MacArthur's newly patented process for treating antimonial gold ores should be tried. You referred to it in your columns about six months ago; but it may be of interest to remind readers that it consists of dissolving the antimony sulphide by caustic soda solution, then treating for gold, precipitating the antimony by carbonate, and re-causticising the soda. This process has the two disadvantages of not being new, at any rate, in principle, and of being of doubtful value when working on low-grade ores. Consequently Pellew Harvey, one of the directors, and Vincent Shallcross, the manager, strongly objected to its adoption by the company. Apart from any consideration as to the intrinsic value of the patent, they urged that a company like theirs, not blessed with too great financial resources, should not embark on experimental investigations as to the value of new or old metallurgical propositions. However, the majority of directors had their way, elected Mr. MacArthur to the board, and sent out an experimental plant to Australia. Mr. Shallcross, who had many friends amongst Australian shareholders, as well as being a considerable shareholder himself, took up the cudgels against the board. He secured proxies and turned up at the general meeting in London, Aug. 2. By means of his proxies he completely beat the board and prevented two of the members being re-elected. In addition, he defeated the confirmation of Mr. MacArthur's appointment to the board, and secured his own election thereto. In other words he captured the control.

As I mentioned at first, I should not have entered into these details but for the reference in the directors' report to Mr. Shallcross. They say that "the general manager, Mr. Shallcross, having failed to carry out the board's instructions, and having deserted his post in Australia, has been discharged." This is a serious charge to make against a manager of a mining company; but read in the light of my explanation his offense cannot be called a heinous one.

Another remarkable passage in the directors' report is their description of Mr. MacArthur's invention. They say that the new process is "based on principles analogous to his invention of treatment of gold ores by cyanide." Where the analogy comes in is not quite clear, to say the least of it, and the presence of such a sentence in the report reflects on the sagacity of the directors.

General Mining News.

Petroleum Exports—Exports of mineral oils from the United States for the seven months ending July 31 were as follows, in gallons:

	1905.	1906.
Crude	57,310,079	64,658,606
Naphthas	15,709 575	19,649,621
Illuminating	491,102,380	455,748,468
Lubricating	55,708,815	87,960,277
Residuum	38,284,800	37,432,287
Total	658,115,649	665,449,259

Paraffin is included in lubricating oils. The total increase was 7,333,610 gallons, or 1.1 per cent.

CALIFORNIA.

CALAVERAS COUNTY.

San Andreas Blue Gravel Company—Notwithstanding the fact that it was generally supposed this company had struck good paying gravel in its claim at San Andreas, work was last week entirely suspended and the pumps removed.

DEL NORTE COUNTY.

Monumental—A satisfactory strike of ore has been made in one of the claims of this company on Shelly creek. The ledge is a wide one. This discovery will tend to increase the plant for reducing the ore. Mines in the Monumental district, owned by five parties, are being developed. That of the Britten Company is preparing to put up a mill and electric plant, to be among the largest in the section.

FRESNO COUNTY.

Cinnabar Ore—Perry Newgard, Otto Axtell and William Johnson have filed notice of location on claims to a strip in the northeast quarter of section 18, township 22 south, range 18 east. These claims are in what is known as the Aetna mining district, and quicksilver is the mineral to be mined.

MARIPOSA COUNTY.

Exchequer—This company, near Hornitos, is preparing to make some substantial improvements. Superintendent Miles O'Brien has a force of men at work excavating the foundation for a 30-stamp mill. Work on the dam is being rushed. The electric power plant is also being equipped and the quartz mill will be in operation by November 1.

NEVADA COUNTY.

Butte-California—This recently organized company has taken over the Sharp group of claims near Nevada City, and the property is being developed and ore being shipped. The claims were originally owned by Sharp, Barr & Martin. Sharp died about a year ago, when work was suspended. The present owners will add to their working force as rapidly as development will warrant. The ore is free-milling, and is being shipped to custom mills at Nevada City and Grass Valley.

Delhi—One of the largest pumps in the county has been purchased for use at this mine above Nevada City. The pump was in use for a short time at the old Allison Ranch mine below Grass Valley before that property closed down.

Central Consolidated—At this mine the shaft has been pumped out, and operations in that part of the property will soon be under way.

Banner—Good headway is being made again at this mine, sinking being in order once more. The shaft is now down nearly 860 ft. and is being driven ahead with all speed, as it is intended to sink to 1200 ft. depth.

Junction—At this copper mine, near North San Juan, development work is being pushed ahead. A crosscut is being driven, and a compressor is to be installed so that power drills may be used.

PLUMAS COUNTY.

Swearinger Copper Mine—Walker Brothers, of Salt Lake, have bonded this property near Genessee, where Samuel E. Swearinger has been at work for nearly 30 years.

Rush Creek—This company now has ample funds to make all improvements preparatory to active placer mining when the water season begins. The company owns several miles of channel, which is believed is rich in placer gold.

SAN BERNARDINO COUNTY.

Trojan—This company, having leased from the Bonanza King Development Company its old mine, has just begun a 10-stamp silver combination mill and expects in the near future to install 10 more stamps. The old workings are found to be of value, inasmuch as the company which operated the property some 20 years ago and discontinued operations owing to the mill being burned, worked only ore that would go 80 oz. silver and more. It is the purpose of the new company to sink below the sixth or 400-ft. level, opening up new ground. The mill was installed under contract by Elliott & Drescher, of Prescott, Arizona. Power is furnished throughout the mill and pumping stations, by distillate engines, manufactured by the Western Gas Engine Company, of Los Angeles, Cal., except the hoist, which is steam. There is a large tonnage of ore on the new and old dumps. The former superintendent of the mine, E. J. De Lano, having resigned, A. M. Rockwell, late superintendent, has assumed charge of the mine and mill and is at present working a force of 75 men, which will be increased as soon as accommodations will warrant. The mine is at Providence, the post-office address being Fenner, California.

SHASTA COUNTY.

Niagara—In the Scorpion mine, owned by this company, near French gulch, and worked under lease by Cannon, Fox & Walker, a strike has recently been made, the grade of the ore being high. The Scorpion was a good producer 10 years ago, but had been closed down for several years because there was no ore in sight. Mr. Cannon secured a lease and started a crosscut on the lowest level. A new ore-shoot was cut at 40 ft., and the ledge shows up good values in free gold, besides carrying sulphurets and galena.

Meek—Ore is being shipped by S. A. Meek from this mine at Quartz Hill to the Mammoth smelter. A steam pump has been installed and the water is kept out of the shaft. The shoot in the bottom is 2½ ft. in width and is well defined, having perfect walls. A steam-hoisting plant will be installed.

Mount Shasta—This mine at Shasta, which has been idle for a year or two, will resume active operations.

SIERRA COUNTY.

Poker Flat—At this mine, Frank P. Roddy superintendent, they intend shortly to resume operations.

Little Grizzly—At this mine, near Bunker Hill, gravel which prospects well has been struck, in an upraise 700 ft. in on the tunnel. The owners are Chas. Keiler, John Hood, Samuel Miller, and Joseph Nipp.

Sovereign—St. Louis men have been examining this mine in Ladies cañon with a view to purchase. It was discovered two years ago and is owned by George McGee, George and Horace Moore and Ernest Farrell.

SISKIYOU COUNTY.

Morrison & Garlocks—The electric motors for operating the hoist and mill at this mine in Quartz Valley are being placed in position.

Quartz Hill—This mine, near Scott Bar, after lying idle for some time on account of litigation will shortly resume operations. There is a 10-stamp mill on the property.

Shelby—At this mine, near Fort Jones, Noel Graves, manager, rich ore has been encountered, and drifts are being run both ways on the vein.

Blue Ledge—At this copper mine, Elliott Creek district, 90 men are at work, and new electric machinery has been installed.

TRINITY COUNTY.

Bullychoop—For this mine there is now on the way a complete electric generating plant to furnish power and light. A 20-stamp mill has been ordered.

Bonanza King—The new wagon road to this mine has been completed, and a 20-stamp mill is being installed. The aërial tramway is also finished. There are now 300 men employed in and about the mine.

COLORADO.

LAKE COUNTY—LEADVILLE.

Big Chief—Recent development work in this property, Carbonate hill, and in the Castle View has opened up bodies of ore in practically new territory and there is

sufficient in sight to keep the property busy for a long time. A large body of lead ore was opened at the 775-ft. level, and this is being opened by drifts, winzes and upraises to facilitate the handling; a raise will be carried to the 600-ft. level and when the connections are made the tonnage from the mine will be greatly increased. Work is being carried on at the 500- and 50-ft. levels and the ore being shipped from the four different levels consists of oxide, lead and carbonates, the lead coming from the bottom level. The daily tonnage is 200 tons.

South Evans Gulch—Considerable work is being carried on at the different properties and with few exceptions all are shipping. The rich streak of ore recently opened in the Winnie holds out and it has now been opened for over 200 ft. Prospecting work is being carried on at the Kitty shaft and during the week a streak of ore has come in at the breast of one of the drifts, showing that the drift is getting into the ore-bearing country. The Enterprise people are drifting from the 200-ft. level, but so far have not caught the ore-shoot. The unwatering of the Silver Nugget shaft is completed, and work of sinking has been resumed. On the north side of the gulch a new plant of machinery has been placed on the Gnome, adjoining the Izard, and sinking will start this week. A number of men are employed at the Ella tunnel and incline, and steady shipments of 50 tons daily are being sent to the smelter; the ore is a sulphide carrying good values in gold. From the St. Louis tunnel about 30 tons daily are going out of ore that will net $30 per ton.

Badger Shaft—This shaft, Adelaide park, has been unwatered and work has been started at the 90-ft. level; drifting will be carried on from this point to catch the ore-shoots from the South Iron hill. When this property was last worked good bunches of sulphides were caught in one or two of the lower drifts.

Mammoth—During the week the south drift from the bottom of the shaft 130 ft. caught a body of galena ore; the ore came in at the bottom.

La Plata—This mine, California gulch, is shipping in the neighborhood of 50 tons daily of oxide ore from the upper workings and development work is being carried on in the lower zone to catch the sulphide bodies.

Bartlett Tunnel—Sugar Loaf district is shipping 150 tons daily of high-grade ore; the values are in gold, silver and lead. Development work is being carried on in new territory.

SUMMIT COUNTY.

Summit county camps are getting a good share of visitors this summer, and the visitors are of the class to make good use of their opportunities. Most of them are moneyed men from the Eastern and Southern States and are looking for good, sound investment in the Western mines.

Washington—The owners of this mine have decided to put in additional concentrating and separating machinery to take care of the zinc contents of their ore.

Little Sallie Barber—This mine is now working on ore at the 100-ft. level, and the product being shipped assays $2 in gold, $13.33 in silver, and contains a little lead.

Senator—This property on the Upper Blue is opening up well. A number of stockholders recently visited this and the adjoining mines and are well pleased with the progress made.

Bullion King—This mine, on Gibson hill, is being developed by Foote & Hight under a lease, and has made a record production of zinc ore. King & Hammel, sub-leasers, have opened up an 18-in. vein of lead carbonates right on the surface.

Old Union—Connection is expected to be made between the main tunnel and old surface workings in a few days. This will afford cheaper working of the mine, and give good ventilation.

Lucky—The mill on this mine is now working on the low-grade ore from the mine, and is turning out a good grade of concentrates. A new strike of shipping ore has just been made.

Kokomo—At Kokomo, activity is apparent everywhere, and the results of various milling tests on the complex zinc ores having been favorable, the old zinc properties are fast being revivified.

Wilfley Mine—A large roasting furnace is being erected on this property for assisting in the more complete separation of zinc, lead and iron products by electromagnetic separators.

Felicia Grace—An important strike has been made in this property, now being operated by Leadville men. The present owners got possession of the property early this spring and sunk a shaft 180 ft. At 110 ft. a drift was run to tap the old workings, and in so doing a new orebody was cut. Samples of this ore give by assay $5 in gold, 80 oz. silver and 30 to 40 per cent. lead. The upper contact also contains considerable pay ore.

FLORIDA.

The Baltimore *Manufacturer's Record* reports that Col. Albertus Vogt of Bartow, Fla., and associates have about consummated negotiations for the purchase of phosphate lands in Citrus and Hernando counties, for a cash consideration of $215,000, and will make an expenditure approximating $100,000 for the erection of plants, construction of railroads, etc. The property referred to consists of a tract of 280 acres in Citrus county which is said to have been purchased from Edward Holder of Dunnellon for $85,000, development to be facilitated by the erection of a plant to cost $25,000 and the construction of a railroad four miles long to connect the plant with Inverness. There is also a second tract of 1365 acres in Citrus and Hernando counties which has been purchased from William Brooks, of Tampa, for a consideration of $135,000. A plant to cost $25,000 will be erected on this property, and a railroad 2½ miles long constructed to connect the plant with Floral City.

MARYLAND.

ALLEGANY COUNTY.

Consolidation Coal Company—The *Manufacturers' Record* says that this company has completed its drainage tunnel, which has been driven for the purpose of draining the Hoffman and Eckhart mines in the George's Creek field. The tunnel is a little more than two miles in length, and is straight excepting a turn 400 ft. from the mouth. It is 8 ft. high and 8 ft. wide, and extends from the end of the tunnel at the Hoffman mine to the outlet at Horseshoe Bend on Preston run near Clarysville. The old tunnel will be cleaned out and timbered and continued between the Hoffman and Eckhart mines, while a drainage heading and ditch will be started to tap the Carlos mine, located two miles from the upper end of the tunnel. The Ocean mine will also be drained. The engineering department of the company, H. V. Hesse, chief engineer, superintended the work, which was done by Philip Jenkins & Sons, as contractors.

IDAHO.

SHOSHONE COUNTY.

Hecla West—This company has been incorporated by W. Y. Clark, of Spokane, Wash. The company has taken a bond on the Bamboo Chief group at Burke, and has begun development.

Idaho-Los Angeles—This company, at its recent meeting, elected the following officers and directors: President, Otto Brown; vice-president, A. McDonald; secretary, N. Wittner; treasurer, J. W. Fink; director, H. Leighthead. The company is driving a long crosscut tunnel to tap the ledge at depth.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Quincy—The stockholders met Aug. 8 and voted to authorize the issue of 50,000 shares of new stock of $25 par value, increasing the capital from $2,500,000 to $3,750,000. The new stock is to be used for extending operations and acquiring new property. The Quincy is the first company to increase its stock since the amendment to the Michigan law, which increased the maximum capitalization allowed from $2,500,000 to $10,000,000.

The company has declared a dividend of $2.50 per share for the second quarter of the current year. This makes $10 declared this year, $5 having been paid in February for the second half of 1905, and

$2.50 in May for the first quarter of this year.

Cliff.—This mine, owned by the Tamarack, will be explored by underground openings, after an idleness of many years. No. 3 shaft will be cleaned out and operated again. Boilers and other machinery will be installed. It is planned to investigate the amygdaloid beds traversing the tract, and to test their copper contents. No. 3 shaft parallels the Greenstone formation at a distance of 1700 ft., the shaft being sunk in the Cliff fissure vein. It is 300 ft. deep. Diamond drill explorations which have been under way for the last year will be continued, the plan being to secure a complete cross-section. A diamond drill is now operating near the center of Section 7, and has reached a depth of 500 ft. in all.

KEWEENAW COUNTY—COPPER.

Keweenaw—A contract has been let to James J. Byers & Co., of Houghton, for the grading of the remaining six miles of roadbed of the Keweenaw Central railway from the Mohawk mine to Calumet. The contract calls for the removal of 150,000 cu. yd. of earth, and the completion of the work by Jan. 1, 1907. John C. Shields, superintendent of the Mineral Range railroad for the last 14 years, has resigned, and has become general superintendent of the Keweenaw Central. The latter road has entered into traffic arrangements with the Copper Range, and will form a juncture with it at a point near Calumet.

ONTONAGON COUNTY—COPPER.

Victoria—R. A. Schultz, a graduate of the Columbia School of Mines, has accepted the position as mining engineer at this mine. Arrangements are being made for the construction of a dam across the west branch of the Ontonagon river, at or near the outlet of Lake Gogebic for the purpose of raising a head of water on the lake for augmenting the supply for operating the hydraulic power plant near the Victoria mine during the dry period.

MONTANA.

CASCADE COUNTY.

At the coal mines owned by the Amalgamated Company at Belt, a 300-ft. inclined air-shaft is being driven from the workings to the surface.

SILVERBOW COUNTY.

Butte Coalition—A diamond drill has been sent through the vein of the Valdemer, an Alice Company mine, at a depth of 1800 ft. by Coalition, which holds a controlling interest in the Alice property. The hole was made from the face of a crosscut about 300 ft. from the vein. The vein is said to contain commercial copper ore. The company is mining 400 tons of ore a day in Nipper ground, and a large quantity from a newly discovered vein in the Minnie Healey. It is sinking the shaft on the Tramway rapidly, a depth of more than 200 ft. having been attained. The wrecking crew is working on the smelter.

Amalgamated—With the exception of the loss of one day by Boston & Montana, on account of a strike of employees in the smelter, all mines of this company have been operated to capacity since Aug. 1. Mountain View is ready for increased output by reason of added facilities, new engine and substitution of skips for cages. The shaft on the West Colusa will be timbered from top to bottom shortly, and while the work is in progress the ore will be raised through the shaft on the Mountain View and Leonard. The new engine on the latter will be ready for work this week.

North Butte—No particular increase in the output has been made at this property since the new engine began operations, as there is some work to be done before the veins can be worked to the best advantage. The yield is about 1100 tons a day.

Butte & Superior Copper—This company, with a capitalization of $6,000,000 in 1,200,000 shares of $5 par, has been organized under the laws of Arizona to operate the Blackrock and four other claims in the Blackrock group, which are supposed to be good. Eight more claims comprise another group owned by the company. The value of the latter is problematical. The public will be asked to buy $4,000,000 worth of stock in the company. Senator Clark owned part of the Blackrock group, but sold it to the company, taking 80 per cent. of the purchase price in stock. Clark will sink a deep shaft on the Poser, which adjoins the Blackrock, in order to explore the vein of the Poser and Elm Orlu, of which he is the owner. He has bought the Pilot, near the Elm Orlu. The Butte & Superior claims it has copper ore in the Blackrock, on which there is a shaft 500 ft. deep.

East Butte—It is operating principally by leasing its shafts. The output of ore during July was about 47 tons a day. It is sinking a deep shaft, with what result remains to be determined.

Original Consolidated—The mines of the Original are yielding about 1000 tons of ore a day, all of which is going through the company's plant.

Davis Daly—Active work has begun on this property. In addition to the long crosscut going south from the 1800-ft. station of the Original mine, ground has been broken for a foundation for machinery on the Lizzie, and the old shaft on the Mount Moria is undergoing repairs. The shaft on the Silver King will be deepened.

New Work—Butte Copper Exploration has reached a depth of 800 ft. on the Six O'clock group, and the surface power is to be increased by the addition of two boilers. Four boilers from the old Heinze smelter have been planted at the Greenleaf, a Boston & Montana property. Bullwhacker is down more than 300 ft., and lessees on the claim have struck a body of copper ore that assays 3.20 per cent. The vein has been crosscut 18 ft. at a depth of 50 ft., and only one wall has been found.

NEVADA.

ESMERALDA COUNTY—GOLDFIELD.

Jumbo—The Vermilyea ledge, which on the surface yielded the lessees such rich shipments a year ago, has been picked up again in the surface open cut. It is 18 in. in width, and the average value is placed at $1000 per ton. It gives promise of leading to a large orebody. Good shipping ore is being developed in the 200-ft., 250-ft. and 300-ft. levels in this mine.

Daisy—The main shaft on this property is down 180 ft., and lately a sulphide-bearing ledge over 9 ft. in width was cut in a crosscut at a depth of 130 ft. The owners have contracted for a mill and cyanide plant to be erected within eight months.

ESMERALDA COUNTY—BULLFROG.

Mayflower—The manager of this property is hurrying the sinking of the shaft from the 180-ft. level to 200 ft. The ore is a free-milling manganese-bearing quartz and averages about $20 per ton. A mill and cyanide plant will be erected as soon as the railroad is completed.

Indian Girl—The Bullfrog Mining Company is drifting on the Indian Girl, on the east side of Ladd mountain, and good milling ore is being raised. The company proposes to run its main tunnel on the western side of the mountain right through to cut the workings in the Indian Girl, and cut other ledges which are believed to intersect the mountain. This tunnel is now in 700 ft., or a little over.

Denver Bullfrog Annex—The tunnel in this promising property is being straightened out and enlarged. Sinking operations will shortly be commenced. The orebody at present assays well. Development operations, however, must be considerably enlarged before shipping ore in quantity can be obtained.

Montgomery-Shoshone—The shaft has now reached a depth of 400 ft., where a station is being cut before starting to crosscut. The ledge in the drift from the tunnel in this property is between 15 and 20 ft. in width and carries high-grade ore. About 50 men are employed.

Gibraltar—The ledge is about 18 in. in width. The winze which will connect tunnels Nos. 1 and 2 is almost completed, and the main shaft has been sunk to a depth of 120 ft. A force of 30 men is employed.

Round Mountain—Reports from this camp are of a new strike of rich silver ore; also, of a vein of cinnabar. It has been opened up for some depth and

promises to develop. Every one at Round Mountain is busy developing his property and the showing on many of the claims is most promising.

Ramsey—The reports from this new camp are all optimistic. People are pouring in from every direction, and all are bent on making locations of their own, or securing a lease. It will take some time to prospect the ground as the mineralized zone is some six by 10 miles in extent. The ore is practically free-milling and there is plenty of water and some timber.

LINCOLN COUNTY.

Bristol—A deal is said to be pending for the sale of these copper mines at Bristol, which have produced from leases about $100,000 during the past six months.

Horseshoe—The mill of this company at Fay has begun operations again aft r undergoing alterations and is running on gold ore, which is said to average $13 per ton.

Gold Butte—There is a good deal of mining activity in the Gold Butte district, which is situated about 45 miles southeast of Moapa. A post office was recently established which is known as Gold Butte. The principal property in the camp is being developed through an adit by the Gold Butte Mines Company, of which L. A. Copeland, of Salt Lake, Utah, is president. The Granite Nevada Mining Company, of which W. C. Sharpe, Gold Butte, is manager, is preparing to install a hoisting plant as well as the Kimberly Nevada Mining Company, of which O. Wiser, Kimberly, Utah, is manager. Gold Butte is a gold camp.

NYE COUNTY.

Ore Shipments—The shipments over the Tonopah railroad for the week ending Aug. 2 were: Lone Mountain, 30 tons; Goldfield, 1451; Tonopah, 2426; total, 3907 tons. The shipments from Tonopah in detail were: Tonopah Company, 1087 tons; Tonopah Extension, 826; Belmont, 340; Midway, 88; Montana-Tonopah, 85; total, 2426 tons, as above.

NEW MEXICO.

DONA ANA COUNTY.

Organ Mountain District—The Organ Mountain Mining Association is booming the Organ district and hopes soon to have a new railroad from El Paso, 45 miles to the south. The line will come through Soledad pass, then follow the west foot hills, till it crosses the Organ range north of Organ, and then continue on the east side as far as San Andres. In the latter region is Gold Camp, in which the Mormon Mining Company has a 25-ton mill running on ore from the Mormon mine, and owns the South Slope, North Terrace and Grand View claims. Another promising mine is the Doña Dora; near by are the Silver Bell, Sophia, Gold Spring and Galloway, while in Texas cañon the Mascot claim has a 7-ft. ledge of pyrite with $15 values.

The west side of the Organs is, however, the best, where the noted Torpedo copper mine has just been purchased by Chicago parties for $325,000 from its receiver. The new owners will unwater the workings and erect a smelter as soon as sufficient ore is developed. Another copper producer is the adjoining Memphis, while the Excelsior, Copper Bar, Merrimac and Little Buck are all likely prospects.

The best known of the lead-silver mines is the Stephenson-Bennett, discovered by a Mexican in 1849, and worked in native fashion for 30 years, the ore being smelted in an adobe furnace, at Fort Fillmore, on the Rio Grande. Since 1882, it has been worked by Americans and often ships concentrates, from its 60-ton mill, that are valued at $1000. A new shaft, equipped with air compressor and steam hoist, is now being sunk to 1000 ft. depth. Five miles southward, the Modoc mine, owned by the American Metals Company, has installed three Wilfleys and two vanners and is shipping lead-silver concentrates to the smelter.

SANDOVAL COUNTY.

Cochite Camp—The Navajo Mining Company is evidently in earnest in its proposal to rehabitate Cochite Camp. For a start, it proposes to run an aërial tramway from its Lone Star mine to its mill below Bland, in order to treat 100 tons a day. As the vein is said to be 100 ft. wide on the third level, a new mill will soon be in order. The Peralta Mining Company is planning to reopen its mines in Peralta cañon, which were shut down in 1901, and will treat its ore in the Bland mill. It is to be hoped that Cochite will now recover from the disastrous failure of the Albemarle mill some 8 years ago. As the land titles at Cochite were validated at the same time as those of the other disputed Mexican land grants, there should no longer be the legal uncertainty to retard development.

NORTH CAROLINA.

SURRY COUNTY.

Mt. Airy Granite—This company now controls about 300 acres of granite of uniform quality at Mt. Airy and 1750 acres at Wilkes mountain. By means of improved methods the capacity has reached between 2000 and 3000 cars annually. The natural conditions are particularly suitable to a method of quarrying which is probably unlike anything of the kind in the country. The quarries cover a gently sloping hillside, consisting of a solid, homogeneous mass of moderately hard granite. The stone shows no ledges or bed planes, but splits readily in a straight line in any direction. In order to quarry economically, this feature is taken advantage of in the creation of artificial ledges to work to. Large sheets of granite are separated from the hill at a single operation by the use of powder and compressed air in combination. The stone is then split up into proper sizes for commercial purposes. Substantial buildings have been constructed for the various operations of quarrying. The new stone-cutting plant is 300x 65 ft. and will be extended 300 ft. This plant is supplied with an electrical crane of 25 tons capacity, 16 surfacing machines and pneumatic tools of all kinds. The main boiler plant has an aggregate capacity of 420 h.p. An Allis-Chalmers generator, direct coupled to a high-speed engine and having a capacity of 100 kw., furnishes the power for crane and surfacing machines and will later be used to operate independent machines in machine shops, etc. There is no waste product from the quarry, due to the operation of a rock crusher, through which all waste is passed. This machine is a No. 4 Allis-Chalmers (Gates) breaker, which has been in steady operation since 1898, when it was installed there by the original company. The product from this machine is sold for railroad ballast, concrete material and other uses.

OREGON.

BAKER COUNTY.

Belcher—The Belcher and Golden Gate groups, the property of the Dains Mining and Milling Company, in the Greenhorn camp, 26 miles west of Baker City, will be reopened at once, under the management of Fred Dains and superintendency of P. A. Brady, who has just arrived here from the Cœur d'Alenes. The property has been idle for nearly a year. The machinery for a 20-stamp mill is on the ground.

Gold Coin—The stockholders of this company, in the Durkee district, 30 miles southeast of Baker City, have arranged to rebuild their 10-stamp mill which burned to the ground recently. Manager T. W. Ayers has a force of men at work cleaning away the debris and preparing for the erection of a new mill which will be made by the Hammond Manufacturing Company, of Portland.

Queen of the West—Forty men are at work in this gold mine, in the Cornucopia camp, doing development work and building the new stamp mill, all of the machinery for which is on the ground. The Queen of the West is a neighboring property to the Union Companion and the Mayflower.

Mayflower—The new stamp mill and cyanide plant at this mine in the Cornucopia camp, 80 miles east of Baker City, has begun operations, under the management of George W. Boggs. The property belongs to the Stampede Mining Company, a Spokane, Wash., corporation, and has been well developed during the past two years.

Flagstaff—P. A. Campbell, of Boston, has arrived to take charge of this mine, 6 miles from Baker City.

United Elkhorn—F. P. Hays, owner of the United Elkhorn mines, 16 miles west of Baker City, and under the management of Edward I. Field, has returned to Philadelphia. He has authorized the resumption of work on the big tunnel at the 2500 level. The new tunnel is at the base of the steepest portion of the mountain and has a fine mill site with plenty of water and timber.

MALHEUR COUNTY.

A new district has been opened at Mt. Rastus, 45 miles west of Baker City, and a number of claims have been located. There is plenty of water, but little timber.

PENNSYLVANIA.

BITUMINOUS COAL.

Thompson-Connellsville Coke Company—This company has let a contract to John R. Bennett, of Fairmont, who is to build two plants, each of 400 ovens. They will be located near the Oriental and Republic works in Redstone and Luzerne townships, where the company owns 1600 acres of the 9-ft. Pittsburg vein. One hundred ovens are to be built at each plant before Jan. 1, 1907. Contracts have also been let for two shafts and for about three miles of railroad to connect with the Dunlap's creek branch.

SOUTH DAKOTA.

Some figures recently made show that the tonnage of gold ores milled in the Black hills for the month of July was 159,300. This is exclusive of the sands that were re-treated. These amount to about 63,000, making a total tonnage of 222,300. There are in process of construction in and adjacent to Deadwood three mills which will be running before the close of the year and which will add not less than 32,250 to the monthly tonnage.

LAWRENCE COUNTY.

Victoria Extension—A force of 15 men is employed at this property. A three-compartment shaft is being sunk to encounter an ore body, and has reached a depth of 50 ft. The ore occurs in the lime.

Lucky Strike—The management of this property, situated on Box Elder creek, south of Roubaix, is planning to resume work on an extensive scale next month.

Branch Mint—Almost 90 men are now employed at this mine, 58 at the mill and 25 at the mine. On the 300-ft. level of the Hoodoo shaft, the Gilt Edge Maid vein has been cross-cut and is 24 ft. wide.

PENNINGTON COUNTY.

Standby—A shoot of ore, which though low grade can be handled at a small cost, was recently encountered. While development work is going on, the mill is being overhauled. In a short time 20 stamps will be dropping.

Lookout—This ground, situated 3½ miles from Rochford, has been bought by Charles R. Bishop, of Berkeley, California. A large amount of development was done several years ago, before the property was tied up by litigation. The ore occurs in a well-defined vertical 50 ft. wide. There is a 40-stamp mill on the property.

Lucky Baldwin—The new pump and boiler have just been installed. Work on the shaft is progressing satisfactorily.

TENNESSEE.

CUMBERLAND COUNTY.

Flynn Cove—This property, on Laurel creek, has been sold to the North American Coal and Coke Company. It covers 4000 acres of land. A branch line is to be built to connect the property with the Nashville, Chattanooga & St. Louis road.

MAURY COUNTY.

The operators in the phosphate district are complaining of the scarcity of labor, many of them finding difficulty in filling their contracts for this reason.

Brown Rock Phosphate Company—This is a new company, which has bought the Matthews and the Rea lands in the Southport district, 366 acres in all. Arrangements are being made to mine phosphate on a large scale.

Harris—Mining has been begun on the Harris place, in the Southport district, and shipments will begin soon. John Ruhm, Jr., is in charge.

TEXAS.

TITUS COUNTY.

Cookville Coal Company—This company has been organized at Cookville to develop a lignite property near that place. D. A. Cook, of Cookville, and G. W. Coker, of Texarkana, are incorporators.

UTAH.

BEAVER COUNTY.

Estella—This company, operating near Milford, has a mill equipped with 25 stamps.

Horn Silver—This company has encountered a new oreshoot on the 700 level of its mine, which is similar in character to that found in the older workings.

JUAB COUNTY.

Tintic Ore Shipments—The output of this district last week was 147 carloads, or about 6000 tons. The contributing mines and number of cars were: Ajax, 2; Carisa, 6; Centennial Eureka, 42; Beck Tunnel Con., 7; Black Jack, 8; Bullion Beck, 6; Dragon Iron, 9; Eureka Hill, 3; Eagle & Blue Bell, 3; Gemini, 3; Grand Central, 6; Godiva, (concentrate), 2; Mammoth, 21; May Day, 3; Ridge & Valley, 2; Scranton, 4; Swansea, 3; South Swansea, 1; Uncle Sam Consolidated, 2; Uncle Sam Consolidated (concentrate) 2; Victoria, 6; Yankee Consolidated, 4 cars.

Scotia—Shipments are about to be started from the West Tintic property of this company.

Utah Mine—The management is preparing to explore this property at greater depth. The lowest level is 800 ft. at present.

Centennial Eureka Mine—A new and larger compressor will replace the one now in use.

SALT LAKE COUNTY.

Consolidated Flagstaff—Shipments from this Alta mine have been inaugurated again. The driving of the Emma tunnel to intersect the Flagstaff ledge is progressing.

Gypsy Blair—The control of this company has passed to the owners of the Kennebec mine near Alta. The officers now are: W. J. Craig, president; Alex Colbath, vice-president; Charles O. Ellingwood, secretary and treasurer; who, with S. M. Levy, William Crome, Harvey J. Jones and E. B. Critchlow, all of Salt Lake, are directors.

Free Coinage—A contract has been made to extend the adit through which this property is being developed. It is now in 500 ft. The mine is at Alta.

Standard Copper—Leasers working on the Saginaw claim in Bingham have encountered a body of good shipping ore.

City Rocks—This company, operating at Alta, is constructing an aerial tramway to serve as a feeder for the Continental Mines and Smelters Corporation's system, which is five miles long. The City Rocks Company will save about 50c. a ton on all ore shipped to the Salt Lake smelters.

Ohio Copper—F. Augustus Heinze has consented to spend $50,000 to determine if the orebodies of this mine at Bingham continue to depth and has entered into an agreement to that effect. His late option on a control of the stock was modified accordingly. The work is to be executed under the direction of Duncan MacVichie, managing director, and H. L. Charles, general manager of the Bingham Consolidated, and is to be performed within the present year.

Utah Copper—This company, through D. C. Jackling, manager, has let a contract to the Allis-Chalmers Company, for reciprocating engines connected to two 2500-kw. generators for use in the new power plant, now under construction. Other contracts will soon follow. The steam plant will consist of a battery of 20 boilers.

SUMMIT COUNTY.

Western Monitor—This company has undertaken to go to patent with 10 lode mining claims, situated near Park City.

Daly—This company has resumed development through the Federal tunnel. The mine has been closed practically ever

since the disaster to the Ontario drain tunnel, 15 months ago.

Daly Judge—In addition to the crude-ore shipments, the company is putting through the mill about 175 tons of zinc middlings daily, from which a profit of about $8 a ton is derived.

Park City Shipments—Seven mines shipped 2100 tons last week, the shippers and amounts being: Silver King, 600; Daly Judge (crude ore), 355; Daly Judge (zinc middlings), 287; Little Bell, 333; Keith-Kearns, 31; New York, 13; Jupiter, 11 tons.

Daly Judge—This company made a net profit on its July operations of about $50,000. The company will probably pay a dividend in October or November.

Daly West—An upraise from the 900 level has encountered the Little Bell contact fissure, and officials of the company believe another important oreshoot has been found.

TOOELE COUNTY.

Consolidated Mercur—The new Board has organized with John Dern, president; Hubbard W. Reed, vice-president; George H. Dern, general manager and treasurer; A. Reeves, secretary. All are of Salt Lake City.

WASHINGTON.

FERRY COUNTY.

San Poil—W. M. Crummer, the lessee, has broken 200 tons of ore, which remains in the mine for want of a market. Work has been suspended until arrangements for the sale of the ore can be made.

Belcher—A new tunnel has been started at a much lower elevation than the No. 3, and the company proposes to construct an aërial tramway from the portal to the Belcher Mountain Railway track below, where ore bins will be put up. The electric fan has been removed from No. 3 tunnel to the new one.

Winnipeg Mining Company—An ore-bin has been constructed about 600 ft from the Hawkeye shaft, at the Belcher Mountain Railway track.

Umatilla—In anticipation of railroads being built from Republic to Keller work will be resumed. A tunnel on the east side of Toloman mountain, 1½ miles west of Keller. has been driven about 750 ft. and intersected a 14-ft. vein, which carries copper.

STEVENS COUNTY.

First Thought—An upraise of 113 ft. has been cut through from the tunnel to the surface, and a winze has been sunk below the tunnel 65 ft. The stopes are being well opened. The vein is 30 ft. wide and has well defined walls. Ore for shipment is now being drawn from a stope 45 ft. below the surface.

OKANOGAN COUNTY.

Multnomah—This company owns a group of claims overlooking the Columbia river. Considerable was done in surface prospecting and driving tunnels, but for some time the company was inactive. Work was resumed a few months ago.

Q. S. Gold Mining and Smelting Company—A. M. Dewey, manager, reports that day work was discontinued July 7, and a contract was let to drive an additional 100 ft. of tunnel, to be finished before Sept. 20. When day work was discontinued, the tunnel had penetrated 128 feet of vein material of commercial value, which contains a large percentage of iron. A contract has been closed with Messrs. Nixon & Kimel, electrical engineers, of Spokane, Wash., for a complete plant for generating electric light and power of guaranteed 200 h.p. at the mine. It is planned to construct a ditch and dam and establish a pole line, also to install a General Electric Company dynamo and generator and a turbine wheel on Sinlahekin creek; but it has not yet been decided whether to use an air compressor or electric drills. A contract has been placed with the Washington Machinery and Supply Company, of Spokane, for a sawmill.

Lost Cañon—This mine has been sold to an Indiana and Ohio syndicate for $10,200 by E. P. Gailliae, who has received the first cash payment. The purchasers have bonded the Grant and three other claims adjoining. The claims are all situated in Beaver cañon, near Chesaw.

Poland China—A deal is on for the sale of this mine near Chesaw to an eastern syndicate.

York—Work in the mine is progressing steadily, and the mill will be started up again immediately.

Polepick Group—The company has been reorganized, and work will be started on the Polepick claim in Twisp Valley.

WEST VIRGINIA.

New River Company—This company has been organized by Boston and West Virginia parties. It has an authorized capital of $5,000,000 in 6 per cent. preferred, $10,000,000 in common stock. The officers and directors of the company are: S. Dixon, president; W. A. Paine, first vice-president; S. F. Kelley, second vice-president; J. W. Smiley, secretary and treasurer; Lewis A. Watnes, F. W. Scarborough, W. M. Butler, James F. Shaw, Arthur Dunn, P. W. Sprague, Symington Macdonald, Henry N. Sweet, Eugene P. Carver and Edward S. Jones. The company has arranged to purchase the New River Fuel Company's property, which consists of the stock of a number of coal companies, owning a large area of coal lands in the New river district, on which are now 29 operating shafts. The new company will take the $4,000,000 stock of the New River Fuel Company on the basis of one share of preferred and two of common for each share of the Fuel Company stock. This will take $4,000,000 preferred and $8,000,000 common stock, leaving $1,000,000 preferred and $2,000,000 common to be used for future developments. The companies owned or controlled are: Macdonald Colliery, Sugar Creek Coal and Coke, White Oak Fuel, Mabscott Coal and Coke, Stuart Colliery, Collins Colliery, Dixon-Pocahontas Fuel, Great Kanawha Colliery, Cranberry Fuel, Price Hill Fuel, Beckley Coal and Coke, Dunn Loop Coal and Coke, Harvey Coal and Coke, Prudence Coal and Coke Company.

KANAWHA COUNTY.

Coalburg-Kanawha Coal Company—This newly organized company has bought the Coalburg Mining Company's property from Geo. W. McClintick, receiver. The purchasing company will make improvements to the mining plant and increase the output as fast as possible. A large area of No. 5 seam of block splint will be opened and extensive areas of Coalburg and Belmont or Crown Hill seams will be developed. Machines will also be put in the Cedar Grove and Peerless gas-coal seams, each containing about 1000 acres of undeveloped coal.

WYOMING.

UINTA COUNTY.

An electric pumping plant is to be installed in No. 1 coal mine at Diamondville, which is controlled by the Amalgamated Copper Company.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA—SLOCAN DISTRICT.

Vancouver Group — M. S. Davys, of Nelson, has been operating this property under lease since last December. Recently he transferred his lease to Le Roi No. 2, Ltd., of Rossland, of which company Paul S. Couldrey is manager. Mr. Davys has been successfully developing the mine along lines inaugurated by Leslie Hill, managing director and engineer for the company owning the property. The lead is about 7 ft. in width, in places widening to 14 ft. It contains two streaks, 12 to 14 in. in width, of clean shipping ore running about 100 oz. silver per ton and 45 per cent. lead. The remainder of the vein is mixed lead and zinc ore, all good concentrating material. Mr. Davys shipped five carloads of marketable ore, and there are about 6 cars on the dump, making 11 cars taken out in the course of development drifting by what is known as No. 4 tunnel, in which the ore is exposed along a length of 180 ft. The same shoot of ore has been opened in No. 3 level above, where it has been drifted on for about 50 ft., showing ore of similar character and grade. A winze farther in No. 3 is down 65 ft. in good ore—galena and dry ore. When connection shall have been made between Nos. 3 and 4 and ventila-

tion provided, it will be practicable to produce two cars of shipping ore per week from these levels.

BRITISH COLUMBIA—YMIR DISTRICT.

Second Relief Mining Company—The annual meeting of this company was held at Nelson, Aug. 4. The company was organized in the spring of 1905 to acquire and operate the Second Relief mine, situated in the Erie section of Ymir district. The financial statement to June 30 last shows proceeds received from gold bullion and concentrates, $85,843. Against this all operating expenses—mine, mill, management, etc., were $64,809, leaving a mine profit of $21,033. Boarding house and store profits were $2003, making a total profit of $23,036. Beside this, there is a sum of $7000, estimated net value of 18 tons of concentrates awaiting shipment. The total profits were therefore about $30,000, while the subscribed capital was only $20,000.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Snowshoe Gold and Copper Mines, Ltd.—Shareholders in this company have been notified by the directors that an agreement for leasing the Snowshoe mine, at Phœnix, and all its appurtenances to the Consolidated Mining and Smelting Company of Canada, has been completed. The lease upon royalty, which has been executed, is for a period of two years, or until 125,000 tons of ore shall have been extracted. The agreement provides that the lessees shall carry out all work in a proper manner, shall well timber the mine at all points where required in accordance with good mining, and shall perform a reasonable amount of development work. At the termination of the lease the lessees will have, provided they shall have given three months' previous notice in writing of their desire to do so, the first option to purchase the mine and equipment at a price to be then mutually agreed upon. The Snowshoe Company has appointed Geo. H. Barnhart, of Nelson, formerly manager of the Ymir mine, its agent to inspect weighings of ore and smelter assays, and generally to safeguard its interests.

MEXICO.

GUERRERO.

La Dicha Mines—If it is true, as is now reported, that the Mitchell Mining Company, owning La Dicha copper mines in the State of Guerrero, has increased its capital stock from $5,000,000 gold to $8,000,000, this property should soon be placed in a condition to pay reasonable dividends. Some time ago it was reported that dividends were passed in order to strengthen the company financially and put that money into development work and increased production from the mines, so as to furnish business for La Dicha & Pacific Railroad, a sub-company, and enable the company to pay interest on the railroad's bonds. Now it is said that of the $3,000,000 increase $1,500,000 will be in replacement of the $1,000,000 in bonds now issued by the railroad, thus placing it on a firmer basis; $1,500,000 to be held in reserve or at the disposition of the management for further development work and needed improvements and additions. Among these will probably be a new 50x 180-in. blast furnace and a converter stand, all of which should add to the production and the economy of production.

Taxco District—Out from the Iguala station of the Cueruavaca & Pacific branch of the Mexican Central is the old district about the city of Taxco, whose mines were once rich producers, but had been semi-abandoned, and which are now again attracting attention. Here are located the mines and smelter of the Mexican Smelting and Refining Company, of Chicago. This company for the last two years has been operating with little Mexican adobe furnaces, 12 in number, in which a 24-in. burden is carried with a 2-oz. blast; but these are now being replaced, by L. W. Tatum, president and general manager, with two 40-ton water-jacket lead furnaces. Near this is the property of the Platanillas Mining Company, also of Chicago (171 La Salle street), capitalized at $1,500,000 gold, of which M. J. Samuels is vice-president and general manager. This company is also putting in a 40-ton water-jacketed lead furnace. The section gives considerable promise.

AFRICA.

TRANSVAAL.

The gold production in July is reported at 491,793 oz. fine gold; an increase of 15,818 oz. over June, and a gain of 72,288 oz. over July, 1905. This makes, for the seven months ending July 31, a total of 3,148,260 oz. fine gold, or $65,074,534. The total for the corresponding period last year was 2,780,275 oz.; showing a gain this year of 367,985 oz., or 13.2 per cent.

Coal Trade Review.

NEW YORK, Aug. 15.

There is little that is new to report in the coal markets this week. The Western trade is notable chiefly for greater activity in the Lake trade, as the season of navigation advances. In the local markets there is some complaint about over-supply, and consequent cutting of prices. The mines are generally doing well, however, and in some quarters there is still complaint of difficulty in securing labor.

The Eastern bituminous trade is quiet and steady. Steam coal consumption is good, and supplies are abundant, though here and there there is talk of scarcity of labor and short supply of railroad cars.

The anthracite trade is steady and rather dull. The figures given below show a decrease in production from last year; but supplies seem to be sufficient for all requirements.

COAL TRAFFIC NOTES.

The coal and coke traffic originating on all the lines of the Pennsylvania Railroad east of Pittsburg and Erie, for the year to Aug. 4, was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite	2,748,517	2,528,497	D. 220,020
Bituminous	16,786,629	18,440,238	I 1,653,609
Coke	6,478,465	7,458 360	I. 979,885
Total	26,013,611	28,427 085	I 2 413,474

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the week ending Aug. 11 were 13,608 tons; for the year to Aug. 11 they were 463,978 tons.

The coal traffic originating on the Southern Railway for the six months ending June 30 was: Tennessee district, 828,813; Alabama district, 954,065; total, 1,782,878 short tons.

New York. Aug. 15.

ANTHRACITE.

The hard-coal trade in the East has sunk into a state of repose from which the approaching disappearance of the last summer discount cannot arouse it. In fact, but slight improvement is anticipated before the arrival of cold weather. In the meantime heavy shipments are going to the West and to Lake ports, although traffic at the latter is somewhat restricted by labor disturbances.

Everything in New York is in abundant supply, with the possible exception of certain fancy egg coals. The fine coals are superabundant, as would be expected from the large output of prepared sizes, although no general shading in prices has yet appeared.

Prices throughout August will remain as follows: $4.65 for broken and $4.90 for egg, stove and chestnut. Steam sizes remain at their regular prices: $3 for pea, $2.25@2.50 for buckwheat, $1.45@1.50 for rice and $1.30@1.35 for barley; f.o.b. New York harbor shipping points.

BITUMINOUS.

No material improvement in the Atlantic seaboard soft-coal trade is yet apparent, although here and there orders are coming in with sufficient frequency to increase the daily output of the mines. The supply of cars continues to be a determining factor in the business. If cars are short now when demand for them is comparatively light, the outlook for the busy autumn season is not encouraging.

The far East is sending comparatively few orders regularly, but whenever a market has to be found for the present tonnage, some order usually comes forward to relieve the situation. The Sound shows a slightly increased demand though it is scattered over the territory. New York harbor trade is quiet and prices remain as quoted last week; $2.60 @ $2.75 for the better grades of steam coal $2.40 @2.50 for gas coals f.o.b. New York harbor shipping points.

All-rail trade shows no change, the demand for this class of traffic appearing to be quite constant. Cars are short on almost all roads, the Baltimore & Ohio, the Reading and the New York Central being the worst affected. Vessels in the coastwise market seem to be in sufficient supply and rates hold steady at the quotations of last week.

Birmingham. Aug. 13.

Considerable interest is being taken in the probable outcome of the miners' convention which will be held in this city, beginning Aug. 14. It is generally understood that the Alabama district No. 20, United Mine Workers of America, will call off the strike which has been on at the furnace companies' mines since July, 1904. Something like four thousand miners have been on strike and a large amount of money has been expended by the miners as well as the companies. The companies have gathered a large force of non-union laborers and are increasing their output at the mines right along. What effect the calling off the strike will have on the general coal production in this district cannot be surmised yet. It is believed that the companies will give employment to a number of the men who apply for work, if there are places for them in the mines.

Cleveland. Aug. 14.

The movement of coal has been much heavier during the past week. The southeastern Ohio mines are now in active operation and are shipping an enormous amount to the lakes. The boat supply has become much shorter. It is going to be a difficult problem for the shippers to move more than 11,000,000 tons for the season, which will not fill their contracts. The seriousness of the situation of the shippers has forced an advance in contract and wild carrying charges. Shippers are now paying 40c. to the head of the lakes and 50c. to Lake Michigan points.

While the up-lake market is strong, this territory is weak. Mine-run coal is at bottom figures and sales are made at 90@95c. for steam coal. Slack is strong at 75c., however.

The coke market is strong. Two of the big producers have announced their withdrawal from the trade for the time being, and say they will have no more coke to sell on contract for the remainder of this year. They are willing to take contracts for 1907 delivery only, at an advance of prices, which is being paid. The best grades of 72-hour foundry are selling at $3.50 at the oven and furnace is selling at $2.75@3 at the oven. A shortage of cars is now threatened in this territory.

Pittsburg. Aug. 14.

Coal—Close to 10,000,000 bu. of coal were shipped to Southern ports on the rise in the rivers during the last three days. There was a boating stage one day and some large boats went out with coal for the New Orleans market, and the fleets passed Cincinnati without accident. Coal loaded in barges went to the Cincinnati and Louisville markets. Empty craft will be brought up later in the week and this will insure steady operation for the river mines. The railroad coal mines were operated more satisfactorily, but there is still a scarcity of cars and production is not near capacity. Prices are a trifle firmer and quotations this week are on a basis of $1.10@1.15 for mine-run coal at the mine.

Connellsville Coke — Production and shipments of Connellsville coke declined last week, owing chiefly to the scarcity of labor in the region. There was a change in prices, foundry coke advancing sharply and furnace coke falling slightly. Foundry is quoted this week at $3@3.10, and furnace at $2.60@2.75 a ton. The *Courier's* detailed report gives the production for the week at 272,879 tons, compared with 272,914 tons the previous week. The shipments aggregated 14,380 cars, distributed as follows: To Pittsburg, 4457 cars; to points west of Pittsburg, 8090 cars; to points east of Connellsville, 1833 cars. The production in the lower Connellsville region was 106,020 tons, a gain of 2000 tons compared with the previous week.

Foreign Coal Trade.

Aug. 18.

Imports and exports of fuel in Belgium for the half year ended June 30, were as follows, in metric tons:

	Exports.		Imports.	
	1905	1906.	1905.	1906.
Coal	1,937,955	2,602,660	2,212,017	2,453,441
Coke	181,088	184,307	483,095	428,380
Briquets	26,554	64,486	237,373	212,020
Total	2,145,597	2,851,453	2,932,485	3,093,841

The trade is chiefly with adjoining countries—France, Germany and Holland. There is not a large difference between the exports and imports.

Exports of coal from Germany for the half-year ending June 30, were, in metric tons:

	1905.	1906.	Changes.
Coal	8,191,751	9,734,472	I. 1,542,721
Brown coal	10,545	9,269	D. 1,276
Total	8,202,296	9,743,741	I. 1,541,445

Exports of coke and briquets cannot be given for the year, as a new classification has been introduced. The exports for the four months, March-June, 1906 were: Coke from coal, 1,091,563; from brown coal, 1800; total, 1,093,363 tons. Included in these are 8017 tons to the United States. Exports of briquets for the four months were: Coal briquets, 227,676; brown coal briquets, 79,978; total, 307,654 tons.

Imports of coal into Germany for the half-year ending June 30, were, in metric tons:

	1905.	1906.	Changes.
Coal	4,819,006	4,131,808	D. 687,198
Brown coal	3,920,718	4,220,161	I. 299,443
Total	8,739,724	8,351,969	D. 387,755

The coal was largely from Great Britain; the brown coal, or lignite, all from Austria. Imports of coke for the four months, March-June, 1906, were: Coke from coal, 180,060; from brown coal, 10,119; total, 140,179 tons. Imports of briquets, for the four months were: Coal briquets, 38,398; brown coal briquets, 13,863; total 52,261 tons. These imports were chiefly from Belgium and Austria.

Iron Trade Review.

New York, Aug. 15.

There is, in some sort, a repetition of last year's experience. The crops are now assuredly good, which means another year of prosperity. Consumers who have been holding back a little are now coming into the market for supplies. Orders are being taken for deliveries well into 1907, and those who have been too cautious are likely to find that substantial premiums will be needed if they must have deliveries. This is introducing an element of speculation, which is likely to increase.

Naturally, the first flurry is apparent in pig iron. Foundry pig has been eagerly bought, consumers bidding prices up on themselves, as it were. Northern furnaces have advanced their selling prices 50c. to $1 per ton. The Southern makers, who were cutting below $13.50 a little while ago, are now holding at $14.50 and talking $15 at furnace for No. 2 foundry. Basic iron is equally strong and bessemer pig has advanced.

In finished iron and steel there has been less excitement, but the strength is apparent, and buyers have given up all hope of concessions for some time to come. Orders for railroad equipment and structural work are pressing, and it is evident that the capacity of mills will be taxed for the rest of this year and well into next.

Probably the present rush will pass over after a time, and matters will settle down. It is certain, however, that August, usually a dull month, will show an amount of business beyond all precedent.

Lake Superior Ore Shipments—Shipments of iron ore from the Lake ports from the opening of navigation up to Aug. 1 are reported as below, in long tons:

	1905.	1906.	Changes.
Escanaba	2,521,613	2,565,105	I. 43,892
Marquette	1,460,526	1,254,694	D. 205,832
Ashland	1,647,167	1,679,359	I. 32,192
Two Harbors	3 786,404	3,850,943	I. 64,539
Superior	2,467,029	2,671,536	I. 204,507
Duluth	4,115,935	4.982,331	I. 826,396
Total	16 038,674	17,004,368	I. 965,694

The total increase was 5.7 per cent.; of this gain 85.5 per cent. was from Duluth alone. The three Mesabi ports showed an increase of 1,095,442 tons, while there was a loss of 129,748 tons from the Old Range shipping points. All the increase, and more, has come from the Mesabi range.

Pig-Iron Production—The August reports show that on Aug. 1 there were 294 coke and anthracite furnaces in blast. Their weekly capacity was 452,000 tons, a decrease of 8600 tons from that reported on July 1. Taking the estimate of the *Iron Age* for coke and anthracite iron, and allowing for the charcoal furnaces, the total output of pig iron in the United States in July was 2,047,000 tons. The monthly average for the first half of this year, as shown by the American Iron and Steel Association report, was 2,100,484 tons. The present drop in production is due chiefly to the absolute necessity of blowing out a number of furnaces for repairs; the capacity of these being greater than that of new furnaces coming into blast.

Birmingham Aug. 13.

Even with quotations high and firm the Southern pig-iron manufacturers continue to sell their product. There is not a great amount of iron to be had for delivery during the balance of this year, and immediate delivery iron is almost out of the question. No. 2 foundry iron is quoted at $14.50, and reports are common that this price is being bettered. The make in this district is still under normal conditions. The sales made at $14 and under that price will require considerable of the future make. The statement has been made in this section that $15 iron has been sold, some quick delivery, small lot business being accepted at that price. Sales have been made also in this district for delivery during the first quarter of the coming year. The shipments of the product are showing a little improvement. The home consumption is holding up well.

The Southland Corporation has been formed by T. E. E. Bartlett, of Birmingham, David Blair and Edward A. Hine, of New York. The company is now erecting a large machinery manufacturing and steel casting plant at East Birmingham, and will expend something like $125,000. Sugar machinery, heavy steel castings, engines, etc., will be manufactured. Several resignations have recently been tendered and accepted at the steel plant at Ensley, among them being that of Al. C. Ryan, who for years has been superintendent of the blooming mill and rail department. Mr. Ryan will go to Bethlehem, Penn., with a steel plant.

Cleveland. Aug. 14.

Iron Ore—The delay to ore boats at Duluth by the bridge disaster, the shortage of men at the mines and on shipboard and the possibility of a heavy movement of grain, have complicated the ore movement to such an extent that the shippers have again revised their estimate of total movement. It is now said that it will be difficult to do more than duplicate last year's movement of 34,500,000 tons. In the meantime shippers are making every possible effort to move as much ore as possible before the grain movement starts in the fall. Lake rates for the time are stable.

Pig Iron—Cleveland furnaces have been sold up for some time, not being able to sell for spot shipment. This last week the eastern, southern Ohio and Southern furnaces have withdrawn from the market, leaving this territory practically without spot iron. The situation has developed strong buying for the immediate future delivery, which has been carried into next year, some orders covering the first half. The price in now $18 a ton in the Valleys for No. 2 foundry.

Finished Material—The shops are rapidly filling up with big orders. In fact they have so much business on hand that small jobs are being disregarded. This has complicated the demand for steel to such an extent that all weak spots have been eliminated. One more order has been placed for a lake ship and six others are in anticipation. The buying of plates has been so strong that small mills are now selling at a premium. Shapes are also at a premium. Bars are 1.60c. Pittsburg. Sheet mills are sold up, so that deliveries cannot be promised inside of 10 weeks. Billets are still scarce but the market is steady at $34@35, delivered.

New York. Aug. 15.

Pig Iron—The market is active and strong. There has been a rush to buy foundry iron, which has sent prices up 50 to 75c. per ton, on both Northern and Southern iron. Pig for short deliveries is scarce, and premiums are said to have been paid in several cases. Basic iron is also in strong demand.

Current quotations for pig iron are, for New York or parallel delivery:

Northern:	
No. 1 X foundry	$19.25@$19.75
No. 2 X foundry	18.75@19.25
No. 2 plain	18.25@18.75
Forge pig	16.50@17
Southern:	
No. 1 foundry	19@19 50
No. 2 foundry	18.50@19
No. 3 foundry	17.75@18.25
No. 4 foundry	17.25@17.75
No. 1 soft	19@19 50
No. 2 soft	18.50@19
Gray forge	16.25@16.75
Basic pig:	
Northern	18@18.50
Virginia	18.60@19.10
Alabama	.....

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

Bars—Bar iron is in demand and prices are strong, at 1.645@1.695c., tidewater. Steel bars are quoted at 1.645c. Store trade is much better, and the general price has been advanced to 2c., delivered.

Plates—Tank plates are quoted at 1.745 @1.825c., tidewater, according to width. Flange and boiler are 1.845, and fire-box 2.045c. Jobbers ask higher prices for small lots. Local trade is improving.

Structural Material—Prices are nominally unchanged. Beams under 15 in. are 1.845c. for large lots; over 15 in., 1.895c.; angle and channels, 1.845c., tidewater delivery. A large lot of the business here is done by jobbers, who are asking 2.50c. for beams and channels out of stock.

Old Material—The scrap market is active, and dealers are asking more. Heavy steel melting scrap is $16.75 @17.50; No. 1 railroad wrought, $18 @18.50.

Philadelphia. Aug. 15.

Pig Iron—There is an urgent demand for all kinds of pig iron, most of the demand coming from the smaller buyers who appear to be somewhat alarmed over the upward tendency of prices. Their alarm has been aggravated by the fact that in some instances they have been obliged to offer premiums for accommodation. The inquiry from the larger consumers is for basic iron, but the transactions in basic appear to be shrouded in some mystery, at least the parties concerned are rather reticent when inquiries are made. Both foundry and forge iron are selling well, and the hardening process will probably continue because of the action of the smaller buyers, who have been taking things easy, but who now discover that the furnaces are not in a position to accept orders without consulting their old customers. Considerable bessemer iron of the malleable variety has been sold for New England delivery. Foundry iron of all numbers is meeting with very urgent inquiry today and some large contracts will undoubtedly be closed before the end of the week. Last week's quotations hold, but they do not represent some of the premium prices which have been paid.

Steel Billets—There is urgent inquiry for billets, and a higher range of prices is close at hand. Quotations are given at $29@30.

Bars—Bar iron while it has not nominally advanced, frequently sells in a retail way something above the quoted prices. The base price is still quoted in a large way.

Sheet—The sheet mills throughout the State have been quietly loading up with business, and prices are very strong.

Pipes and Tubes—The tube market is strong and orders have been going to the mills. It is rumored that the mill people are more disposed to make concessions, but if there is any ground for such rumor it is only to large buyers.

Plates—The urgent inquiries that are coming from car-builders, ship-builders, boat-builders, and makers of boilers, have a stimulating effect upon the market. The fact that some of the Western plate mills are filling up is having the effect of hardening prices in this market.

Structural Material—The orders for structural material for the past week have been made up of lots ranging from 100 to

1000 tons. The average quotations are 1.83½@2c. delivered. There is an immense amount of bridge work to be taken care of this winter and next spring.

Steel Rails—We have had for the first in a long time a rather quiet week as regards steel rails. There are some inquiries from outside countries and these inquiries are of an imperative nature, and will result in business probably of about 50,000 tons. There are also some inquiries today from the builders of trolley lines, but these inquiries have not yet resulted in anything. The orders for light rails, ranging from 16 lb. up to 40 lb., are quite important in the aggregate.

Scrap—Nearly all kinds of scrap have advanced 25 to 50c. per ton. No. 1 steel scrap is wanted badly at $17. Choice railroad scrap retailed at $20. All other kinds are slightly higher, but few important sales have been made.

Pittsburg. Aug. 14.

The feature of the iron and steel markets is the heavy demand for pig iron, with sales at premiums above the highest prevailing prices, and negotiations have been opened for deliveries through the first half of next year. There has been a decline in buying of finished material, but this was expected, as sales in July were unusual and greatly in excess of production. An active buying movement will be started in September, likely. Late last week the Republic Iron and Steel Company announced an advance in bar iron of $2 a ton, making the price for common iron bars 1.60c., Pittsburg, and the Cambria Steel Company advanced the price of merchant steel bars by the same amount to 1.60c., Pittsburg. No advance has been ordered by other mills, and former prices are still quoted, but not for extended delivery. It is likely that the new prices will soon become general. There is but little new business in bars, but specifications on old contracts are very heavy. An advance in sheets and tin-plate may be ordered at any time, as the independents have difficulty in operating on account of the scarcity and high prices of steel. New business in plates is light, but the mills are filled with orders that will keep them running to capacity the rest of the year, with large tonnages under negotiation for next year's delivery. Heavy specifications on structural material are still being received, but no new business of importance is being booked. Steel rails continue to be among the most active of finished lines, and orders placed this week amount to about 15,000 tons; inquiries are in for large tonnages, aggregating over 100,000 tons.

Pig Iron—The pig-iron market has not been so active at any time since the opening of the year, and there are a number of remarkable features. The scarcity of foundry iron is the most notable, and premiums are paid for delivery in the third quarter and in some instances for the rest of the year. The absolute minimum for bessemer iron is $18, Valley furnaces, for this year, and large tonnages were sold yesterday at $18.25. An effort was made to establish a price for next year, but without results, and the market will be an open one. The most important transaction of the week was the bessemer purchases of the Jones & Laughlin Steel Company. This large interest bought 15,000 tons for delivery in the fourth quarter at $18, Valley, and 30,000 tons for the first three months of next year at $17.75. This year's iron was sold by an independent furnace company and next year's iron was bought from the Bessemer Pig Iron Association. The association also sold 20,000 tons for the first quarter at the same price. J. G. Butler, chairman of the association, is expected in Pittsburg tomorrow and may close a deal with the Youngstown Sheet and Tube Company calling for 10,000 tons a month for the first six months of the year at $17.75. One independent furnace interest today closed sales of bessemer for fourth quarter amounting to about 8000 tons. One lot of 3000 tons was sold at $18.25 and the rest of the tonnage was in lots of 500 and 1000 tons at $18, $18.10 and $18.25, Valley furnaces. It is now known that the association has no more iron for delivery this year and has not reserved any for the United States Steel Corporation, as was reported early this quarter. The Corporation today bought another 5000-ton lot of heavy melting scrap for delivery this month, at the same price paid for the scrap bought last week, $16.50. Basic iron also is active and the price likely will be advanced to $17.75 tomorrow, when a deal for 3000 tons for first quarter, now pending, is closed. A contract closed today at $17.50 calls for 6000 tons for equal deliveries during the first six months of next year. It is impossible to buy foundry iron for delivery in the third quarter at any price. A local interest bought 1500 tons of Southern No. 2 foundry, paying $15, Birmingham, or $19.60 delivered in Pittsburg. This was a premium of $1 over the recent price for Southern foundry. Offers of $18, Valley furnaces, have been freely made for No. 2 foundry, but without success. From present indications foundry iron will pass bessemer in price for deliveries during the closing months of the year. Gray forge also has advanced and is held firmly at $17.60, Pittsburg.

Steel—Crude steel continues scarce; bessemer billets are quoted at $27.50 and open-hearth at $28.50. The demand for sheet bars has become so great that the Carnegie Steel Company has changed its Ohio works from steel rails to sheet bars. The price is firm at $29. Merchant steel bars likely will be advanced to 1.60c. in a short time, but plates will remain at 1.60c.

Sheets—The market shows but little change from last week. The demand is active and mills are behind in deliveries. Black sheets are firm at 2.50c. and galvanized at 3.55c. for No. 28 gage, but it is reported an advance may be ordered soon.

Ferro-Manganese — The market continues irregular and 80 per cent. is quoted at $85@90 for third quarter and about $85 for the rest of the year.

Cartagena, Spain. July 28.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report that shipments for two weeks were three cargoes, 9100 tons manganiferous ore, to Great Britain. The mines are all busy on contracts. What little new business is offered is taken at higher rates. Tonnage is less abundant and ocean freights are firmer.

For iron ores quotations are: Ordinary 50 per cent. ore, 8s. 9d.@9s. per ton; special low phosphorus, 9s. 3d.; specular ore, 58 per cent. iron, 12s. 6d.; S. P. Campanil, 10s. 6d. For manganiferous ores prices range from 12s. for No. 3 ore, 35 per cent. iron and 12 manganese, up to 14s. 3d. for No. 1 B, 25 iron and 17 manganese. No ore of No. 1 grade is offering. All prices are f.o.b. shipping port.

Iron Pyrites—Quotations for iron pyrites, 40 per cent. iron and 43 sulphur, are 10s. 8d. per ton, f.o.b. shipping port. There are many inquiries for this mineral, but miners are holding back, claiming that present prices do not pay them. Exports for the week were 340 tons to France.

Dusseldorf, Germany. Aug. 2.

The Iron and Steel Union reports the output of the German blast furnaces in June at 1,009,015 metric tons of pig iron. This is 39,135 tons less than in May, the difference being slightly more than was due to the shorter month. The daily average was 33,634 tons in June and 33,811 tons in May. For the half-year ending June 30 the output was as follows, in metric tons:

	1905. Tons.	1905. Per Ct.	1906. Tons.	1906. Per Ct.
Foundry iron...	869,397	17.1	1,050,878	17.3
Forge iron.....	399,528	7.8	419,810	6.9
Steel pig.....	319,751	6.3	454,407	7.5
Bessemer pig...	190,807	3.8	238,492	3.9
Thomas pig....	3,319,105	65.0	3,910,349	64.4
Total.....	5,098,588	100.0	6,073,936	100.0

The increases were in foundry iron, 181,481 tons; forge iron, 20,282; steel pig, which includes spiegeleisen, ferro-manganese, ferrosilicon and all similar alloys, 134,656; bessemer, 47,685; Thomas, or basic, pig, 591,244; the total gain being 975,348 tons, or 19.1 per cent.

The production of coal in the German Empire for the half-year ending June 30 is reported as below, in metric tons:

	1905.	1906.	Changes.
Coal.....	56,630,591	67,257,295	I. 10,626,704
Brown coal	24,944,082	26,911,978	I. 1,967,896
Total mined..	81,574,673	94,169,273	I. 12,594,600
Coke made.	6,554,776	9,778,480	I. 3,223,704
Briquets made,	6,077,639	6,956,631	I. 878,992

The briquets are made chiefly of lignite, or brown coal. The demand for coal is

heavy this year, and that for coke exceeds the supply.

Chemicals.

NEW YORK, Aug. 15.

Copper Sulphate—There is no change in the market, or in prices. Business is still good.

Nitrate of Soda—Demand is good, and futures are strong. The position is good, but much depends on the arrangement of labor troubles on the West Coast.

Phosphates—Messrs. J. M. Lang & Co. report the exports of phosphate rock through the port of Savannah in July as follows: Great Britain, 3010; Germany, 1066; total, 4076 tons.

Sulphur—Exports of sulphur from Sicily for the half-year ending June 30 were 791,073 tons in 1905, and 243,734 tons in 1906; a decrease of 47,339 tons. The shipments to the United States were 5256 tons in 1906; an increase of 3728 tons. Stocks July 1 were 324,430 tons in 1905, and 439,601 tons in 1906; an increase of 115,171 tons.

Messrs. Emil Fog & Sons write from Messina, Sicily, under date of July 31 as follows: The bill proposing the Consorzio Obbligatorio has been voted by Parliament and comes into force on Aug. 1. The legislators, when framing the bill, were greatly preoccupied by the existence of the stock of the Anglo-Sicilian Sulphur Company, and in order to prevent the possibility of its disturbing influence they provided that anybody owning on July 31 more than 15,000 tons of brimstone will have to choose between becoming a member of the Consorzio or relinquishing his stock in favor of the new concern at the fixed price of 5.90 lire per 100 kilos. The Anglo-Sicilian Company, of course, protested energetically, but as its remonstrations were of no avail, it decided to sell its entire stock at the aforementioned figure. They possibly thought to be able to dispose of a very large portion of it before Aug. 1 by selling under market prices. However, these sales caused a considerable decline, and the Ministry, which became alarmed, had to step in and prohibited continued sales. The actual position of our market may therefore be summed up as follows: The Anglo-Sicilian Company unable to sell, dissidents without stocks, and the Consorzio is not yet in a position to quote—a combination of circumstances, amounting to nothing less than a complete dead-lock to trade. On the other hand we have the anomaly of an immense stock, too big to find room in the many warehouses, and forming everywhere an incumbrance on the beach, where it is being deposited in great quantities, but no means to buy, except in small lots from second hand. Great mystery also surrounds the future development of prices, as nobody seems to have even an inkling of what they may be like under the Consorzio, although, according to general opinion, they will not open low. As regards the attempts, which will most likely be made, to reduce the output of brimstone, they seem to have little chance of success for some time to come, or as long as there is sufficient money at the disposal of the Consorzio.

Metal Market.

New York, Aug. 15.

Gold and Silver Exports and Imports.

At all United States Ports in June and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
June 1906..	$3,256,392	$2,374,261	Exp. $882,331
" 1905 .	4,030,882	2,149 051	" 1,881,831
Year 1906..	31,610,714	52,542,959	Imp. 20,932,245
" 1905..	39,831,590	16,609,453	Exp. 23,222,137
Silver:			
June 1905..	4,518,386	3,740,285	" 778,101
" 1905 ..	4,744,625	2,356.078	" 2,388.547
Year 1906 ..	33,437,227	23,657,101	" 9,780,126
" 1905 ..	25,091,266	15,173,423	" 9,897,843

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.

For week ending Aug. 11 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week...	$ 7,000	$ 165,131	$ 552,935	$ 12,814
1906.....	5,932,003	48,287,063	37,130,253	1,303,610
1905 ..	37,929,843	971,929	20,138,961	2,337,388
1904.....	66,741,579	3 661,385	25,054,124	595,088

The gold exported for the week went to South America; the silver to London. Imports of gold for the week were from Cuba; of silver from Mexico.

The United States Government has appeared in the market as a buyer of silver for the first time in 13 years, except for the silver bought within three or four years for coinage for the Philippines. This took about 13,500,000 oz. in all, the buying extending over a considerable period. Since the repeal of the Sherman law in 1893, the requirements of the Mint for subsidiary coinage have been met from the bullion accumulated under that law. That is exhausted, however, and to supply the need for subsidiary coins it has become necessary to buy silver.

Accordingly tenders have been invited at the office of the director of the Mint in Washington on Wednesday, Aug. 15, up to 1 o'clock p.m., and every Wednesday thereafter until further notice. These tenders are to be for delivery at the Philadelphia, New Orleans or Denver mints, settlement to be on the New York basis, of bullion guaranteed 0.999. The Treasury reserves the right to reject all tenders or accept such part of any tender as may suit its convenience.

It is understood that arrangements have been made for future deliveries, which will insure a supply in case of any combination to increase the price unduly. Moreover, the purchases will be distributed so as not to disturb the market. The requirements for the rest of this year will be about 100,000 oz. weekly.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Aug. 11, gives the following totals, comparisons being made with the corresponding week of 1906:

	1905.	1906.
Loans and discounts..	$1,139,891,400	$1,072,468,300
Deposits.....	1,186,659,200	1,062,904,300
Circulation.....	50,467,500	46,054,500
Specie	221,391,000	188,939,000
Legal tenders.....	88,120,600	85,058,600
Total reserve.....	$309,511,600	$273,997,600
Legal requirements....	296,664,800	265,726,075
Surplus reserve.....	$12,846,800	$8,271,525

Changes for the week this year were decreases of $4,723,400 in loans, $6,608,200 in specie, $2,666,700 in legal tenders, $13,695,000 in deposits, $462,100 in circulation and $5,851,150 in surplus reserve.

The following table shows the specie holdings in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York.....	.....	.....	$188,939,000
England.....	$181,561,955	.....	181,561,955
France.....	583,995,500	$212,389,080	796,384,580
Germany	168,925,000	56,305,000	225,230,000
Spain.....	76,005,000	123,060,000	199,065,000
Netherlands....	27,737,000	28,705,500	56,442,500
Belgium.....	16,293,335	8,146,665	24,440,000
Italy.....	148,560,000	19,439,000	167,999,000
Russia.....	546,335,000	30,030,000	576,365,000
Austria.	234,345,000	62,285,000	296,630,000
Sweden....	19,390,000	.....	19,390,000

The returns of the associated banks of New York are of date Aug. 11, and the others Aug. 10. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows for the year to Aug. 2:

	1905.	1906.	Changes.
India.....	£ 4,058.641	£ 10,808,313	I. £ 6,749,672
China....	749 394	213,700	D. 535.694
Straits..	2,800	1,750	D. 1,050
Total.....	£ 4,810,835	£ 11,023,763	I. £ 6,212,928

Imports for the week were £2,000 from Australia; £312,000 from China; £4,000 from the West Indies; £164,000 in bars, and £2000 in Mexican dollars from New York; a total of £484,000. Exports were £271,700 in bars, and £45,200 in Mexican dollars; £316,900 in all, to India.

The demand for Indian Exchange is better, but the rate is unchanged, the Council bills offered in London being taken at an average of 16d. per rupee.

The silver market has been strong and advancing on buying in London market for China and India. The announcement of resumption of silver bullion purchases by our Government for mint purposes has also had an effect on prices.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars.....	$0.50⅞	$0.53
Peruvian soles and Chilean.....	0.46¾	0.49¼
Victoria sovereigns.....	4.85⅛	4.87½
Twenty francs.	3.86	3.89
Spanish 25 pesetas...	4.78	4.80

SILVER AND STERLING EXCHANGE.

Aug.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Aug.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
9	4.8515	65⅜	30 1/16	13	4.8470	65½	30 1/16
10	4.8490	65½	30 1/16	14	4.8470	65¾	30 1/16
11	4.8475	65⅝	30 1/16	15	4.8475	66⅛	30⅝

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals.

Daily Prices of Metals in New York.

Aug.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis. Cts. per lb.
9	18⅝ @18¾	18 5/16 @18⅜	82⅞	39¾	5.75	6.02½	5.87½
10	18⅝ @18¾	18 5/16 @18⅜	83 1/16	40¾	5.75	6.02½	5.87½
11	18⅝ @18¾	18 5/16 @18⅜	. . . .	41	5.75	6.02½	5.87½
13	18⅝ @18¾	18 5/16 @18⅜	83 1/16	41⅛	5.75	6.02½	5 87½
14	18⅝ @18¾	18 5/16 @18⅜	83⅛	41⅛	5.75	6.02½	5.87½
15	18⅝ @18¾	18 5/16 @18⅜	83 1/16	41⅛	5.75	6.02½	5.87½

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper—There have been no new developments in the market. A good volume of business was done with European as well as domestic consumers at unchanged prices. Quotations at the close are 18⅝@18¾ for lake; 18 5/16@ 18⅜ for electrolytic; and 18@18⅛ for casting copper, ordinary brands.

The London standard market was quiet but very firm and closes at £83 8s. 9d. for spot and £83 3s. 9d. for three months.

Refined and manufactured sorts are quoted: English tough, £85 10s.@£86; best selected, £88; strong sheets, £95.

Exports of copper from New York for the week were 2015 tons. Our special correspondent reports the exports for the week from Baltimore at 1493 long tons of fine copper.

Tin—The scarcity of supplies in this market has become acute and practically fancy prices are being paid for material which is wanted at once. Notwithstanding the fact that the London market has become a good deal easier, prices for spot tin remain 41½c. The weaker tendency expressed in the London quotations, however, has made buyers rather chary of now contracting for their future supplies, and for this reason forward tin is entirely neglected. Toward the end of last week, large orders which were placed from here in the London market stiffened the same considerably, so that at one time it touched £184 for both spot and futures. The close is flat at £180 15s. for spot and £180 5s. for three months.

Lead—A good business is being done in this metal at unchanged prices, 5.75c New York.

The London market has become very firm and is cabled at the close at £17 for Spanish and £17 1s. 3d. for English lead.

The movement of foreign lead in the United States for the half-year ending June 30 is reported by the Bureau of Statistics as below, the figures being in short tons:

In bond, Jan. 1	8,148
Imports, six months	47,407
Total supplies	55.555
Re-exports, six months	24,263
In bond, June 30	6,545
Total deductions	30,808
Balance	24,747

The balance has, presumably, entered into consumption in this country.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us on Aug. 15 as follows: Lead is quiet but firm. The latest prices here are 5.65@ 5.67½c. for Missouri brands.

Spanish Lead Market—Messrs Barrington & Holt report from Cartagena, Spain, under date of July 28, that pig lead is 76.25 reales per quintal, f.o.b. Cartagena; silver contents being paid for at 13.50 reales per quintal. Exchange is 27.88 pesetas to £1. The lead price, on current exchange, is equal to £15 6s. 4d. per long ton. Exports for the week were 406 tons argentiferous and 1024 tons desilverized lead to Great Britain; 300 tons desilverized to Antwerp; 50 tons desilverized and 509 tons argentiferous to Marseilles.

Spelter—Transactions in this metal are still of an insignificant character, but on account of the total absence of stocks, prices are not affected thereby and close unchanged at 5.87½ St. Louis and 6.02½ New York.

The European market for spelter, where also supplies are of a limited nature only, remains firm and closes at £26 15s. for good ordinaries and £27 for specials.

Spanish Zinc Ore Market—Messrs Barrington & Holt report from Cartagena, Spain, under date of July 21, that the market for blende continues weak, with few buyers except for immediate requirements. Shipments for the week were 50 tons calamine to Germany.

Silesian Spelter Market—Paul Speier reports from Breslau in Silesia, under date of July 31, that the market is generally steady, though consumers have been holding off a little. Quotations are about 53 marks per 100 kg. (5.63c. per lb.) for good ordinaries and 53.50 marks for special brands, f.o.b. cars at works. Exports of spelter from Germany for the half-year ending June 30 were, in metric tons:

To:	1905.	1906.	Changes.
Great Britain	10,223	10,389	I. 166
Austria Hungary	8,664	8,910	I. 246
Russia	2,973	2,582	D. 391
Italy	1,196	1,799	I. 603
Other countries	7,464	5,226	D. 2,238
Total	30,520	28,906	D. 1,614

Zinc sheets are steady and unchanged and the conditions are also unchanged in zinc-dust, which is quiet. The exports and imports in Germany, other than those of spelter, were as follows for the month of June:

	Exports. 1905.	Exports. 1906.	Imports. 1905.	Imports. 1906.
Zinc sheets	1,447	1,527	5	2
Scrap zinc	461	341	153	225
Zinc-dust	.....	469	.....	49
Zinc oxide	.....	1,560	.....	372
Zinc-white	711	612	89	175
Zinc ore	4,463	3,796	9,780	14,089

There is an active demand for zinc ores, which it is hard to satisfy just at present.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been small, the highest price having been $8 on Jan. 6, the lowest $7.65 on May 18.

Antimony—No change to be reported. Quotations are nominal at 22½@23c. for ordinary brands; 24@25c. for special.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 40@45c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Platinum—Demand is strong and steady. Prices are unchanged, $26 per ounce in New York. From $20 to $23 per ounce is paid for scrap platinum.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about $43 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export. The London price is lowest at £7 per flask, while jobbers are still selling at £7 2s. 6d.

Aluminum—The chief producers give list prices, for ton lots and over, as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Missouri Ore Market.

JOPLIN, Aug. 11.

The highest price paid for zinc was $48 per ton, on an assay basis of $42 to $45 per ton of 60 per cent. zinc. The average price was $44.02.

The highest price paid for lead was $78.50, with medium grades selling at $74 to $76 per ton. The average was $75.64.

With several purchasing agents offering lower prices, the market for zinc ore was probably retained at unchanged prices by continuous heavy rains during the week, 2½ in. falling in eight hours Wednesday. With a reduced output apparent, other buyers purchased heavily.

Lead prices maintain the unprecedented strength manifested for months, or practically all this year, with the St. Louis Smelting and Refining Company and the Granby Mining and Smelting Company leading in competition. The smelter at Galena, Kansas, is reported to have been closed down permanently, and the Picher Lead Company is purchasing lightly.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	2,504,050	519,720	$76,090
Joplin	2,798,480	211,640	71,008
Galena-Empire	1,030,610	193,690	29,137
Alba	1,022,380	.....	24,026
Prosperity	160,030	297,180	14,690
Duenweg	507,550	78 830	14,414
Badger-Peacock	429,810	2,190	10,183
Aurora	472,850	.....	8,470
Neck City	355,480	.....	8,353
Oronogo	307,080	24,560	7,484
Spurgeon	273,950	47,610	7,145
Granby	345 000	30,000	6,570
Baxter	127,590	54,440	4,873
Sherwood	117,310	10,920	3,112
Sarcoxie	138,190	.....	2,901
Carthage	108,070	.....	2,539
Cave Springs	73,670	.....	1,584
Zinc, Ark	51,0 0	.....	1,020
Zincite	42 930	.....	987
Stott City	40,280	.....	885
Totals	10,906,340	1,460,8 0	$295 471
32 weeks	335,082,950	46 874,310	$9,041,784

Zinc value, the week, $240 116; 32 weeks, $7,258,917.
Lead value, the week, 55,355; 32 weeks, 1,782,867.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72 83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58 00	75.13
May	43.31	40.51	May	58 27	78 40
June	40.75	43.83	June	57.80	80.96
July	43.00	43.25	July	58.00	74.31
August	48.83	....	August	58.00	....
September	46.75	....	September	63.50	....
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Wisconsin Ore Market.

PLATTEVILLE, Aug. 11.

Empire ore set the top price this week, while 60 per cent. zinc ore brought $43.50. The market situation is rather peculiar, inasmuch as the price is increasing simultaneously with an increased local production.

A complete canvas of the district by a conservative observer would show a splendid condition of affairs. There is a demand for every pound of ore that is put in the bins, at prices that are satisfactory and leave a good margin for profits. It is a significant fact that a number of the best mines are being purchased by the smelter interests. Several propositions are under consideration now as to purchase.

The camps of the Platteville district loaded ore as follows for the week:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	293,490	.....	.....
Cuba City	183.000	.....	.....
Linden	177,430	.....	.....
Buncombe & Hazel Green	148.500	40,000	40,000
Mineral Point	141,920	.....	.....
Galena	12 ,8 0	.....	42.170
Benton	54,000	.....	.....
Livingston	50,000	.....	.....
Dodgeville	40,500	.....	.....
Montfort	.....	.....	60,000
Total for week	1,214,640	40,000	142,170
Year to Aug. 11	40,838,991	2,146,090	3,573,470

The shipments would have been somewhat heavier for the week if it had not been for a wash-out on one of the principal roads, which prevented the getting in of empty cars.

Mining Stocks.

NEW YORK, Aug. 15.

The stock market continues mainly a professional one, and has been given over to rather meaningless fluctuations. There has been generally an advance, but the public interest has not been specially stimulated thereby.

Amalgamated Copper closes at $103½; American Smelting and Refining Common at $154. Among the industrials, Tennessee Coal, Iron and Railroad has been steady at $155; United States Steel closes at $41½ for the common and $106½ for the preferred.

In the curb market Greene Copper has been the chief point of interest. Col. Greene has issued a long circular, explaining the company's position and minimizing recent unfavorable occurrences. There were a good many sales of the stock, the price closing at $24¾. The other coppers were generally firm, but not specially active. Tonopah Extension sold at $5½, with fair dealings.

On the Consolidated Exchange there were small dealings, and no special interest in mining stocks.

Boston. Aug. 14.

There has been little to excite comment in the local mining-share market this week. Prices have maintained a good tone, but business has lagged; in fact, some of the leading issues are not quoted for days at a time. Money also works against activity in the share market, and then again the attitude of the miners in some of the Lake Superior mines has mitigated against free buying of the shares.

North Butte mining shares received somewhat of a shock by the declaration of a $2 dividend, whereas an increased rate had been looked for in strong quarters. The stock went off $2.25 from the high point to $90. Old Dominion, which has been dormant of late, sprinted to $42, against a close last week at $39.50. Expectation of an early finding of the body of sulphides is responsible for the advance.

Greene Consolidated has worked off $1.62½ to $24.12½. It is now said that T. F. Cole and his followers have taken quite an interest in Greene and have been buyers of the stock lately. This company is said to have a valuable asset in the ownership of 200,000 shares of the Cananea Central Copper Company. A change in dividend payments is said to be likely from bi-monthly to quarterly at the rate of $2 per year, instead of $2.40, as now. Allouez made a sharp advance to $37.25, closing tonight at $36, against $33.25 a week back. It is reported that rock has been struck at the site of exploration of the new No. 2 shaft at a depth of 83 feet.

Butte Coalition responded to an initial dividend of 40c. by touching $33.12½. The price tonight, however, was $30.62½, ex-dividend. Quincy is off $2.50 for the week to $85. This company is now paying at the rate of $10 per year, but the increase in the stock issue holds the price down. Utah ran off $2, to $56, but has recovered most of the decline. Osceola holds steady at just under $107. Bingham has advanced $1.50 from the low to $33.50 on expectation that something will be doing in the stock later. Centennial is up $2.75 to $24.75, and Franklin $1.25 to $17.75 on Lake orders. Copper Range has varied from $74 to $75.37½.

It is announced that the Acme Consolidated Gold and Copper Mining Company, which was traded in on the local curb at from 20 to 25c., will dispose of its property and liquidate. Keweenaw has been the feature of the curb, rising $2.50 to $11.50 during the week. Davis-Daly has been steady on the curb, at from $11.50 to $10.50, and Arizona Commercial at from $38.75 to $37 per share.

Colorado Springs. Aug. 10.

The local market in Cripple Creek stocks has been rather quiet during the past seven days, although prices have held firm, and in some cases have scored advances, Acacia, Dante, El Paso and Work making fair gains.

San Francisco. Aug. 9.

Trading continues to be quiet in the Comstocks. The Tonopahs, however, are showing a good deal of life, and in that section the exchange begins to look like old times. In oil stocks there has been very little doing except in Associated Oil shares.

STOCK QUOTATIONS.

NEW YORK. Week Aug. 14

Name of Company.	High	Low	Clg.	Sales
Amalgamated*	104	100¾	103¾	299 470
Anaconda*	258½	251	257¾	66,200
British Col. Copper	8⅝	8	8⅝	7,059
Butte Coalition*	32⅝	30⅞	31	2,190
Cum. Ely Mining	7½	7⅛	7⅛	4,520
Greene Gold	2⅜	2¼	2¼	9 0 0
Greene Gold & Silver	2⅛	2	2	7,710
Guanajuato	5⅞	5¼	5¾	3,425
Micmac	5⅛	5	5	3.275
Mines Co. of Am	1.25	1.25	1.25	4 380
Mitchell Mining	4¾	4⅛	4⅜	3,500
Mont. Sho. Con. (New)	12⅛	11½	12	4,700
Nev. Utah M. & S.	4	3⅞	3⅝	3,520
Nipissing Mines	6⅛	5⅞	6	20 400
Tennessee Copper	47	44⅛	45¾	3,200
Union Copper	1⅝	1⅜	1⅝	1,400
Utah Apex	5¾	5¾	5¾	100

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	154⅛	151	153⅜	60,600
Am. Smelt. & Ref., Pf.	117	116⅛	116¾	500
Bethlehem Steel	22½	21¾	22	500
Colo. Fuel & Iron	55⅜	52	55	60,600
Federal M. & S., Pf*	97	96	96¾	1,300
Inter. Salt	37	34½	36½	2 035
National Lead	80½	78	79¾	6,100
National Lead, Pf	103¾	101⅞	102½	1,525
Pittsburg Coal	15⅛	15	15⅛	
Republic I. & S.	29½	28⅛	29⅛	2,100
Republic I. & S., Pf.	99⅜	98½	99	900
Sloss-Sheffield	78¼	75	77½	3,700
Tenn. C. & I*	155½	154½	155¼	300
U. S. Red. & Ref	36⅞	35⅛	36	800
U. S. Red. & Ref., Pf.	75	73	74	1,000
U. S. Steel	41⅞	39⅞	41⅝	257 087
U. S. Steel, Pf.	106¾	105	106⅜	43 160
Va. Car. Chem	38⅛	36½	37¼	1,850

* Ex. div.

BOSTON.

Adventure	6	5½	6	145
Allouez	37⅛	33	36⅛	5,170
Atlantic	12⅛	11	11⅛	755
Bingham	33⅛	30¾	33¼	5,045
Boston Consolidated	26⅛	25¾	26	1,512
Calumet & Arizona	110	109	110	325
Calumet & Hecla	700	695	700	22
Centennial	24¾	22	24⅛	2,505
Copper Range	75⅜	73¼	75¼	2,122
Daly-West	17⅜	16⅛	16⅞	600
Franklin	17¾	16⅛	17⅛	1,545
Granby	12¼	11⅜	11⅜	627
Greene Consolidated	25⅞	24	24⅛	6,602
Isle Royal	20	18½	19⅛	11
Mass	8	8	8	255
Michigan	13	12½	13	165
Mohawk	61½	60¼	61	693
Mont. Coal & Coke rcts.	2½	2¼	2⅜	350
Nevada	18⅝	17⅞	18½	230
North Butte	92⅛	90	90¼	7,119
Old Dominion	42⅜	39½	42	3,790
Osceola	107	105	106¼	668
Parrot	27	25½	26	286
Quincy	85½	84½	85	400
Rhode Island	4½	4½	4½	20
Shannon	9¾	9⅛	9⅛	2,195
Tamarack	98	98	98	1
Tecumseh	11	10¼	11	293
Trinity	9	8½	9	955
United Copper, com.	64	62½	63⅞	3,040
U. S. Oil	10¼	9⅞	10	40
U. S. Smg. & Ref.	56¼	55	55¼	561
U. S. Smg. & Ref., Pfd.	46½	46	46	819
Utah Copper	58¼	56	57¾	2,749
Victoria	6½	6⅛	6½	430
Winona	7¾	7	7¾	835
Wolverine	152	147½	149	84
Wyandott	1.00	1.00	1.00	

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agri. Chem., 25½—23⅞; Gold Hill, 2⅝—2½; Comstock, .14; Gugg. Exp., 258—243; Prec. Metals Co., 5½; Standard Oil, 612½—607. (Boston) Ahmeek, 78; Am. Zinc, 9½—8⅝; Arcadian, 2¾—2⅜; Ariz. Com'l, 37½—36½; Black Mt., 10—9; East Butte, 10⅝—10; Keweenaw, 11—8½; Majestic, 1⅝—1; Raven, .92—.88; Shawmut, 1.00; Superior & Pitts., 17½—17; Troy, 1¾—1½.

PHILADELPHIA. Aug. 14.

Name of Company.	High	Low	Clg.	Sales.
American Cement	7⅛	7	7⅛	225
Cambria Steel	34⅝	34	34⅛	771
General Asphalt	8⅛	8⅛	8⅛	168
Penn. Steel, pd	106½	106½	106½	
Philadelphia Co.	51	50¼	50¼	160
Tonopah Mining	18¼	18	18	1,885

PITTSBURG. Aug. 14.

Crucible Steel	12⅞	12¾	12¾	602
Crucible Steel, Pf.	78	77½	78	429
Harbison-Walker Ref.	11	11	11	
Ohio Tonopah	.32	.30	.32	9,200
Tonopah Ext	5⅛	5¼	5⅛	480

COLORADO SPRINGS. Aug. 11.

Name of Company.	High	Low	Clg	Sales
Acacia	14	12	13⅞	12,000
C. C. Con	5¾	5⅝	5⅝	
Doctor Jack Pot	9	8¾	8¾	12,500
Elkton	46	45	45	21 250
El Paso	49½	48	49½	10,600
Findley	73½	69	69½	17,000
Gold Dollar	8¼	8	8	
Gold Sovereign	7¼	7	7¼	9,000
Isabella	23½	23	23	31 500
Jennie Sample	10	9¾	9¾	14,000
Mary McKinney	48	48	48	250
Portland	1.45	1.45	1.45	3,200
United Gold Mines	9½	7⅞	9⅜	4,100
Vindicator	95	92	95	2,500
Work	15¾	14½	15¾	57 500

SAN FRANCISCO. Aug. 8.

Name of Company.	High	Low	Clg	Sales
Best & Belcher	.73	.68	.73	600
Caledonia	.25	.24	.25	200
Challar	.13	.11	.13	2 200
Con. Cal. & Va	.91	.86	.89	6 400
Crown Point	.10	.09	10	2,700
Gould & Curry	.08	06	.08	5,900
Hale & Norcross	.95	.90	.95	400
Mexican	.69	.65	.68	1,500
Ophir	3.50	3.45	3.50	1,300
Overman	.09	.08	.09	800
Potosi	.13	.11	.12	4,400
Savage	.80	.60	.80	2,200
Sierra Nevada	.21	.19	.21	2,900
Bullfrog Mining	.52	.42	.50	44 700
Diamondfield	.39	.34	.38	28 200
Goldfield of Nevada	.46	.35	.46	36,200
Jim Butler	.60	1.30	1.45	37,600
Jumping Jack	.34	.20	.34	150,500
Kendall	.74	.52	.70	4,300
MacNamara	.75	.71	.74	61,200
Manhattan Dexter	.66	.45	.66	60,700
North Star	.48	.45	.48	28,100
Original Bullfrog	.15	.14	.14	14,300
Tonopah Belmont	5.50	5.25	5.37	1,500

Tonopah Stocks. Aug. 15.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	18 25	18.00	18.25
Tonopah Montana	2.85	2.82	2.85
Tonopah Extension	5 50	5.25	5.37½
Tonopah Midway	2.30	2.20	2.20
Tonopah West End	3.25	2.75	3.25
Goldfield Mining Co.	.50	.45	.50
Jumbo Mining	1.50	1.40	1.45
Red Top	1.75	1.70	1.75
Sandstorm	.70	.63	.70
Montgomery Shoshone Cons	12 67½	12 37½	12.37½

St. Louis. Aug. 11.

Adams, $0.40—$0.25; American Nettie, $0.10—$0.08; Center Creek, $2.50—$2.25; Central Coal and Coke, $65.00—$63.50; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$55.00; Columbia, $5.00—$2.00; Con. Coal, $21.30—$19.50; Doe Run (old stock), $340.00—$300.00; Granite Bimetalic, $0.25—$0.20; St Joe (old stock), $32.00—$30.00.

LONDON. (*By Cable.**) Aug. 15.

Dolores, £1 18s. 9d.; Stratton's Independence, £0 4s. 0d.; Camp Bird, £1 5s. 0d.; Esperanza, £3 5s. 0d.; Tomboy, £1 5s. 0d.; El Oro, £1 10s. 0d.; Orovilie, £0 17s. 0d.; Somera, £0 5s. 0d.; Utah Apex, £1 3s. 2d.; Ariz. Copper, Pref., £3 12s. 9d.; Ariz. Copper, Def., £3 10s. 6d.

*Furnished by Hayden, Stone & Co., New York.

New Dividends.

Company.	Payable.	Rate.	Amt.
American Coal Co	Sept. 1	$1.25	$62,500
Am. Smelters' Sec pf. A	Sept. 1	1.50	155,000
Arizona Copper, pf	July 26	0.54	
Arizona Copper, def	July 26	0.54	
Bunker Hill & Sullivan	Aug. 6	0.60	180,000
Butte Coalition	Sept. 14	0.40	400,000
El Oro, Mex	July 16	0.36	388,000
Esperanza, Mex	July 20	0.22	100,100
Granby Con	Sept. 1	3.00	405,000
Homestake, S. Dak	Aug. 25	0.50	109,200
International Salt	Aug. 15	1.00	182,280
Jamison, Cal	Aug. 18	0.03	11,700
Quincy Copper	Sept. 5	2.50	200,000

Assessments.

Company.	Delinq.	Sale.	Amt.
Cal. Grass Valley	Aug. 30	Sept. 15	$0.02
Con. St. Gothurd, Cal	Aug. 23	Sept. 15	0.10
Copper Ranch, Utah	Sept. 4	Sept. 24	0.00½
Morrison, Utah	Aug 14	Sept. 3	0.01
Mountain Lake, Utah	Aug. 15	Sept. 10	0.01
Mt. Pleasant, Cal	Aug. 22	Sept 12	0.03
Savage, Nev.	Aug. 10	Aug. 31	0.10
Spider Utah	Aug 20	Sept. 15	0.00½
Union, Nev	Aug. 15	Sept. 5	0.10
Wasa, Utah	Aug. 11	Sept. 1	0.00½

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30 113
February	61.023	66.108	28.047	30 464
March	58.046	64.597	26.794	29 854
April	56.600	64.765	26.108	29.984
May	57.832	66.976	26.664	30.968
June	58.428	65.394	26.910	30.185
July	58.915	65.105	27.163	30.113
August	60.259	.. ..	27.822	
September	61.695		28.528	
October	62.034		28.637	
November	63 849		29.493	
December	64.850		29.977	
Year	60.352		27.839	

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.416	68.262	78.896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March	15.125	18.361	15.250	18.641	68.174	81.111
April	14.920	18.375	15.045	18.688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June	14.673	18.442	14.813	18.719	65.881	83.994
July	14.888	18.190	15.005	18.585	66.887	81.167
Aug.	15.664		15.725		69.830	
Sept.	15.965		15.978		69.667	
Oct.	16.279		16.332		71.406	
Nov.	16.599		16.758		74.727	
Dec.	18.328		18.398		78.993	
Year	15.590		15.699		69.465	

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	29.325	36.390	July	31.760	37.275
Feb	29.262	36.403	August	32.866	
March	29.523	36.662	Sept	32.095	
April	30.525	38.900	Oct	32.481	
May	30.049	43.313	Nov	33.443	
June	30.329	39.260	Dec	35.835	
			Av. year.	31.358	

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	4.552	5.600	July	4.524	5.750
Feb	4.450	5.464	Aug	4.665	
March	4 470	5.350	Sept	4.850	
April	4.500	5.404	Oct	4.850	
May	4.500	5.685	Nov	5.200	
June	4.500	5.750	Dec	5.422	
			Av., year.	4.707	

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton; February, £ 16.031; March, £ 15.922; April, £ 15.859; May, £ 16.725; June, £16.813; July, £16.525.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April	5.817	6.078	5.667	5.931	23.813	25.781
May	5.434	5.997	5.284	5.846	23.594	27.000
June	5.190	6.096	5.040	5.948	23.875	27.406
July	5.396	6.006	5.247	5.856	23.938	26.800
Aug	5.706		5.556		24.675	
Sept	5.887		5.737		26.375	
Oct	6.087		5.934		28.225	
Nov	6.145		5.984		28.500	
Dec	6.522		6.374		28.719	
Year	5.882		5.730		25.433	

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.